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VOLUME II

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TEXTILE WORLD JOURNAL
KINK BOOK—VOL. II

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TEXTILE WORLD JOURNAL

— BY —

CLARENCE HUTTON
(Technical Editor, Textile World Journal)

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FOREWORD

The aim of these Kink Books is to make available in convenient reference form many of the kinks, formulas, recipes, tables and other technical data originally published in the Questions and Answers Department of TEXTILE WORLD JOURNAL in response to questions from readers. The present volume has been compiled from matter published during 1917. The question and answer form has been preserved because the important points in a problem from the inquirer's viewpoint are often of the greatest value. The answers have been supplied by practical manufacturers, superintendents, overseers and experts in mechanical and chemical lines.

In order to keep the book of convenient size, no reference is made among the questions and answers to the numerous technical articles published during the year. We have felt, however, that the book should contain an index of the leading technical articles and in this volume a subject index of such matter is included, immediately following the questions and answers, which gives the date of the issue of TEXTILE WORLD JOURNAL in which each article appeared.

Textile manufacturing is too varied in its characteristics and the industry is too large for any one man to know all of its ramifications and possibilities. With changing conditions and progress in the textile industry, new problems are constantly coming up for solution and the editors of TEXTILE WORLD JOURNAL cordially invite subscribers to make use of its columns and facilities for getting information required.

TEXTILE WORLD JOURNAL
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NEW YORK

KINK BOOK—VOL. II

Selvage Curl on Cotton Fabric

We are sending you two samples of a 4-harness twill fabric, one showing the cloth from the loom and the other showing the cloth finished. You will note the selvage on the gray cloth is flat, while on the finished cloth it is curled. The finisher says the edge curls up as soon as the cloth is wet and thinks a change should be made in weaving it. Would you recommend a different selvage or should the cloth finish satisfactorily as it is? (3094)

On twills the curly selvage trouble is common. In the present case only six threads are used for each selvage and the wonder is not that the finished cloth is unsatisfactory but that the gray cloth selvage is so good. Some men believe that the only complete remedy for the trouble found in finishing 4-leaf twills is to have a plain selvage.

As the cloth is now woven, the outside end of the selvage is woven in by the filling every fourth pick, making a very ragged and loose selvage. Owing to the construction being heavier in the warp than in the filling, the natural tendency of the cloth when placed in water is to shrink. The cloth curls toward the back because of the open character of the weave on that side.

If the cloth is examined under the microscope, it will be noticed that the selvage ends are all crowded together. When the outside end is crossed by the filling it is pulled over the next three ends and the shrinkage of the filling when wet is sufficient to cause the rolling of the selvage to continue. When it gets a start there is no means, short of a tentering machine, to keep it straight.

By using selvage motions the selvage ends can be made to interlace the filling in plain weave order. This will also

permit the selvage harness to be set so that the filling will be engaged and held by the warp while it is being brought up by the lay, while still setting the beat-up of the body of the cloth wherever it is best for weaving.

If it is desired to avoid using selvage motions, the selvage could be improved by drawing in the selvage threads on the first and third harnesses only, which would make the selvage weave with a plain intersection. By this arrangement every other pick would not be woven in the selvage, but would be drawn to the body of the cloth. The improvement from this change would consist in the fact that when the filling was woven into the selvage every other end would be up or down, and this would give double the number of intersections. This would prevent the shuttle from causing the selvage to roll, which is the first and real cause of the selvage curling when being finished.

Dyeing and Carbonizing Wool

Must wool always be lifted from dye bath in order to feed on more color? Is slow feeding on and poling at same time practical on some shades? For carbonizing, what percentage of sulphuric acid is necessary to change a bath to 5° Tw.?
(2725)

With the ordinary open dye kettles for loose wool, it is practically impossible to lift the wool for the purpose of making additions of dyestuffs to the bath. While it is desirable that the wool be lifted, certain mechanical conditions stand in the way. The principal objection that can be raised where large open tubs are employed is the consequent excessive felting of the fiber. Where large circular vats are used, provided with a rope lattice, considerable time would be lost if this were raised for each addition of color. As a rule, adding successive portions of dyestuffs is conveniently done by previously dissolving the dyestuff in water and adding this dye solution, rather well diluted, taking care not to pour it on the wool at any one spot. Of course, it is necessary that during the addition of the dyestuff, poling of the wool is not slackened. A certain amount of latitude is permissible while dyeing loose wool that cannot be indulged in during the dyeing of piece goods; blotches and clouds being at once formed and noticed on the latter, but which, when formed on loose wool, are lost during the carding.

Regarding the addition of concentrated sulphuric acid necessary to change the bath 5 degrees Tw., this question is inter-

esting. It is supposed that the sulphuric acid used is the ordinary 66 degrees oil of vitriol of commerce, but which contains only 93.19 per cent. of real sulphuric acid. To raise the Twaddle of a given bath to 5 degrees, we should know beforehand the Twaddle above which it is to be raised, and we should also know the volume of the bath. With these two items of importance we make use of the current specific gravity tables that are to be found in many books on dyeing, or, better, by referring to the published American standard tables adopted by the Manufacturing Chemists' Association of the United States, and which are preferable to many widely divergent tables, mostly of foreign origin. For example, suppose our bath stands at 2.8 degrees Tw., this corresponds to 2.23 per cent. oil of vitriol. Five degrees Twaddle, the point to which we wish to strengthen our bath, corresponds to nearly 4 per cent. The difference between 4 per cent. and 2.23 per cent. is 1.77 per cent., or about one pint of oil of vitriol for each ten gallons of the carbonizing bath to be strengthened.

Superheated Steam for Drying

We use a set of drying cans for cotton piece goods, but the capacity of these cans is insufficient for our requirements, and on account of lack of room it will be impossible for us to install another set. Will you please advise us if it is practicable to use superheated steam in these cans, and would it be very expensive to install a superheating system? (3061)

The use of superheated steam, so far as we know, has never been attempted in steam cylinders as ordinarily used in cotton finishing establishments, because the so-called "hard" or fast drying should be avoided on all ordinary fabrics. Excellent results have always followed the rather slow evaporation of the moisture, which leaves the material mellow to the feel, something not obtained when dried "hard."

Calculating Percentages of Wool in Knitted Fabric

What is the method of calculating the amount of cotton and wool in a knitted fabric made from cotton and merino worsted yarns? For instance, in using 2 ends, one of single 25s cotton, and the other single 30s merino, 60 per cent. wool and 40 per cent. cotton, what is the actual percentage of wool in the cloth? (3020)

Several methods may be used in determining the percentage

of wool and cotton in the fabric. One of the most direct methods is to reduce the merino yarn to the cotton standard, calculate the grain weight of 120 yards of each yarn by dividing 1,000 by the respective counts in the cotton standard, and then calculate the percentages. Taking the example given in the question, we find that 30s worsted is equal to 20s cotton, then

$$1{,}000 \div 25 = 40 \text{ grains cotton}$$
$$1{,}000 \div 20 = 50 \text{ grains merino}$$
$$\text{Total} \ldots\ldots 90 \text{ grains}$$

The merino yarn is 60 per cent. wool and 40 per cent. cotton, therefore the grain weight of cotton and wool in this yarn should be found and the cotton added to the grain weight of the 25s cotton yarn.

$$50 \text{ grains} \times .60 = 30 \text{ grains wool}$$
$$50 \text{ grains} \times .40 = 20 \text{ grains cotton}$$

which makes the amounts of cotton and wool as follows:

60 grains cotton
30 grains wool
Total 90 grains

Calculating the percentages from these grain weights we have

$$60 \div 90 = 66.6 \text{ per cent. cotton}$$
$$30 \div 90 = 33.3 \text{ per cent. wool.}$$

Another method that may be used is as follows: Reducing the yarns to the cotton standard we have

25s cotton
30s worsted merino = 20s cotton.

The yarn number is an inverse measure of its weight

$$\text{Relative weight of 25s yarn} = \frac{1}{25}$$
$$\text{Relative weight of 20s yarn} = \frac{1}{20}$$

Total of relative weights equals:

$$\frac{1}{25}+\frac{1}{20}=\frac{4+5}{100}=\frac{9}{100}$$

Proportion of 20s yarn, which is the yarn containing the wool:

$$\frac{1}{20}\div\frac{9}{100}=\frac{1}{20}\times\frac{100}{9}=\frac{5}{9}$$

Since the yarn is 60 per cent. wool, the percentage of wool in the fabric is

$$\frac{5}{9}\times .60=\frac{3}{9} \text{ or } 33.3 \text{ per cent. wool.}$$

Still another method that may be used is as follows: Reducing the merino yarn to the equivalent cotton count, we have

$$\frac{30\times 2}{3}=20$$

Finding the weight of the number of hanks of each yarn equal to the highest counts, we have

$$\begin{aligned} 25\div 25&=1 \quad \text{lb. of cotton}\\ 25\div 20&=1.25 \text{ lbs. of merino}\\ \text{Total...}&\ 2.25 \text{ lbs.} \end{aligned}$$

Multiplying the amount of merino yarn by the percentage of wool it contains:

$$1.25\times .60=.75 \text{ lb. of wool.}$$

And dividing this amount by the total weight of cotton and merino yarns used in the calculation

$$.75\div 2.25=33\tfrac{1}{3} \text{ per cent. of wool in fabric.}$$

Applying this last method to a more difficult calculation comprising three yarns, such as 1 thread of 25s cotton; 1 thread of 30s merino, 60 per cent. wool; and 1 thread of 15s merino, 80 per cent. wool; the procedure would be as follows:

Reducing the merino yarns to the equivalent counts of cotton, we have

$$\frac{30 \times 2}{3} = 20\text{s cotton}$$

$$\frac{15 \times 2}{3} = 10\text{s cotton}$$

Finding the weight of the number of hanks of each yarn equal to the highest counts, we have

$25 \div 25 = 1$ lb. of cotton
$25 \div 20 = 1.25$ lbs. of 30s merino
$25 \div 10 = 2.5$ lbs. of 15s merino

Total... 4.75 lbs.

Multiplying the amount of each merino yarn by the percentage of wool it contains:

$1.25 \times .60 = .75$ lb. of wool in 30s merino
$2.5 \times .80 = 2.$ lbs. of wool in 15s merino

Total..... 2.75 lbs.

And dividing this amount by the total weight of all the yarns used in the calculation:

$2.75 \div 4.75 = 57.9$ per cent. wool.

Weave for Chinchilla Fabric

Please give me the layout and weave of the enclosed chinchilla fabric. (2807)

The sample of cloth accompanying this inquiry is made with the harness chain shown at Fig. 1 on 8 harnesses. The weave is on 4 threads and 8 picks and consists of 4 ends and picks weaving double plain, then changing so that the face warp goes to the back and the back warp comes to the face. The drawing-in draft is straight on 8 harnesses. An analysis of the weave is given at Fig. 2, in which the solid squares indicate the face warp up, the crosses indicate the back warp up, and the circles indicate the face threads raised on the back pick. The arrow shows where the face warp changes to the back and the back warp comes to the face. The warp would consist of 1680 ends, with 24 ends on each

side for selvage, making a total of 1728 ends in the warp. This could be dressed in 3 sections with 12 spools of 48 ends each, or 576 threads in a section. There is about a 5 per cent. take-up in the warp with 13 per cent. shrinkage in

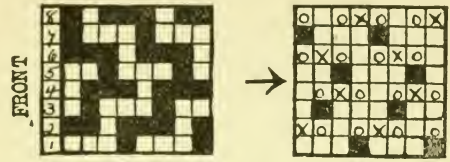

FIG. 1 FIG. 2

width and 7 per cent. shrinkage in length. The reed would be 6½ with 4 threads in a dent, or 13 with 2 threads in a dent, making the cloth 64.6 inches wide inside the selvage, or 66.5 inches wide including selvage. The selvage is of the same yarn as the warp, 2 threads weaving as one. There are 28 picks per inch.

Trouble in Knitting Artificial Silk

I am enclosing a sample of knitted fabric on which we are having difficulty in producing a perfect fabric because of the knots which are found in the artificial silk, causing breakage and other defects. This fabric is made on a 24 gauge spring needle machine with artificial silk of 300 deniers. It is possible that if proper tension were put on the machine it might overcome the trouble, or possibly the gauge ought to be finer. (2872)

The gauge of the machine is all right for the number of yarn used. The yarn must be run with as little tension as possible and close attention must be given to the stitch wheels. In regard to the breakage due to knots, this cannot be overcome by any setting, but by speeding down the machine 50 per cent. better results will be obtained. If the silk is bought in the hank and wound, the trouble may be traced to the kind of knot the winder is tying. A flat knot should be used. The best results are obtained by getting the silk on the cones. It costs more, but the difference will be made up in the amount of waste saved. I should judge from the sample that the yarn is not of a good grade. There is a big saving in using the best grade of yarn, as the percentage of perfect cloth more than pays for the extra yarn price.

War Orders and Electrified Fiber

Due to the necessity of using tops and roving for Government goods before they have time to become aged or conditioned, we are having trouble in spinning. Any suggestions you can make will be appreciated. (3008)

The trouble in spinning worsted tops and roving direct from the preparatory machinery is the familiar one of electrical disturbance and the causes and cures are probably not thoroughly understood by anybody. The difficulty can be avoided by storing the tops in a basement, or minimized by humidifying the air of the spinning room. British manufacturers have recently experienced the same trouble and we asked an English correspondent to state how they had overcome it. His reply, which immediately follows, indicates that spinning lower counts has been resorted to.—EDITOR.

The trouble referred to always recurs when shortage of material obliges spinners to hurry their tops into the frames without the usual interval of rest and from one cause or another the wool-combers here have been persistently behind with their work.

As is well recognized, the electrification and mutual repulsion of fibers is greatest in the case of long wools and the finer merinos and is less marked in spinning the medium qualities. The humidity of the air is an important influence in facilitating the discharge of the electricity and in an atmosphere of sufficient dryness it becomes almost impossible to spin. In making military cloths the long wools are used extensively and they are dyed before spinning. Dyed wool becomes electrified more easily than undyed, and so spinners have had to meet their old foe at its worst, without opportunity of taking exceptional measures to meet it.

In a regular way a Yorkshire spinner of crossbred prefers to buy tops about a month old. He is a shorter or longer time in passing the tops through his drawing frames and he prefers to let them lie four to six weeks in the roving before putting the material on the spinning frame. There is thus a space of about three months between top and yarn, during which interest is running on, to be paid by somebody. The delay looks pretty expensive and it would not be tolerated so universally if it were not worth its cost. The gain in spinning outweighs the loss in interest. The output is larger, a greater length can be got, and the result is a more even

and valuable yarn. All these customary arrangements are upset when tops have to be taken "hot from the comb," as the saying goes, and be turned into yarn to meet the insatiable demand of the authorities.

There has been extremely little opportunity to employ any special devices for discharging electricity or for conditioning the atmospheres of spinning rooms. The difficulty exhibited itself here in all quarters, not as a fanciful one affecting simply the quality of the yarn, but as a direct interference with the quantity produced. It has been met by adapting the demands to the circumstances. The finer that any given material is spun and the more trouble there is to be anticipated from electrical disturbance and to give the trade a better chance to surmount its difficulty thicker counts have been substituted.

The specifications used to require a 2/24s khaki warp yarn from tops of 44s quality, but in order to assist production 2/21s was substituted instead. The difficulty has been met in precisely the same way unofficially, yarns generally being taken in thicker counts than usual and in numbers far below that to which the tops could probably spin were the circumstances in their favor. The remedy is not a radical one. Obviously there is still room for the discovery of a method of neutralizing electrical action at the source, and investigations into the cause of the electrification of the wool fiber during its manufacture are being continued by scientists in Yorkshire. But the above is the practical way out that has been taken in England and that may have to be taken in America.

Size Sticking to Dresser Cylinders

We have been trying to remove the baked-on size, starch and glue that has accumulated on warp dresser steam cylinders. We have used hot water, damp cloths, vitriol and soft soap, but all to no purpose. Will you kindly tell us how to overcome this difficulty? (2965)

I have always found that the size can be easily removed by softening with boiling water when scraping. Once cleaned, the trouble can be avoided by greasing with tallow the first thing in the morning the first cylinder the warp touches. This should be done before the steam is turned on. If this is done regularly an accumulation of size can be removed by merely wiping with a wet cloth.

The question is not so much what will wash the size off

the cylinder as what will prevent it from getting on. No size will stick to the cylinder if it is properly handled. To prevent it from sticking to the cylinder see that the size is thoroughly boiled and put in only enough tallow to keep from foaming. Keep the size at not lower than 200 or 210 degrees F. Put a thermometer in to see that it does not go over this. If the size spatters to the sheet, keep it lower in the box. Keep the immersion roll just half way down in the size, and see that the blankets are in good shape. I make the blanket on the finishing roll with three yards of coarse and three yards of fine cloth. The blanket on the other roll is made with six yards of coarse cloth. Care must be taken to boil the size. If the sheet is heavily sized run the slasher slower. I should boil 1½ to 2 hours for potato starch. I have stopped the size from sticking to the cylinder inside of fifteen minutes by following the above directions.

Crocking of Sulphur Black

I understand that some dyers use sulphide of soda in washing sulphur black. If this is true could you tell me how much washing is necessary after running off the dye and before giving the sulphide of soda? What per cent. is necessary and at what temperature? I understand this is used to prevent the black from rubbing off. I am having trouble of this kind and have increased the amount of sulphide in the dye liquor, but the black still runs off a little. (3507)

With well-dyed goods, soaping will be more effective than treating with sodium sulphide to remove excess of dye, and thereby reduce crocking. The use of sodium sulphide always has a tendency to reduce the fullness of shade, and for this reason is employed to counteract the effects of overdyeing.

Crocking of sulphur black may be due to the presence of too much salt in the dyebath which sometimes "paints" the goods instead of dyeing them. Well-dyed sulphur black should not rub off, and it might be necessary to revise the dyeing recipe so that there is a proper balance between the dye itself, the sodium sulphide present and the soda ash. Avoid any secondary treatment if possible except thorough washing.

Arrangement of Shafting, Pulleys and Belts for Looms

A section of broad silk looms are to be started up that will require a quarter-turn belt on the loom owing to the arrange-

ment. I contend that by having the driving shaft overhead we can get a longer belt and much more even and flexible power, thereby getting a greater and more uniform quality of goods. On the other hand, the superintendent claims that by having the shaft under the floor we can get just as good power and at the same time by eliminating all overhead bearing belts get a safer, cleaner and more sightly weave room. In connection with the driving shaft which would give the more uniform power (1) to drive the shaft slower and use say an 18 or 20-inch pulley, or (2) drive the shaft faster and use a 10 or 12-inch pulley? (2867)

The best position for this shaft is overhead for this reason: longer belts can be used, and the life of these belts will be much longer. If the shaft is placed below the floor, there would not be much more than five feet from center to center of pulleys. On quarter-turn drives this is a short center, as the belt has to turn 90 degrees in five feet. When placed overhead this distance would be increased to about eight feet centers or more and the belt would not have such hard usage. The looms would run more steadily with the longer drive, and hence a better product would result.

From an engineer's point of view no shafting is unsightly. The shafting can be kept clean by putting on one or two leather rings, and these will keep all lint off, as they will continually be moving back and forth on the shaft. By means of neat oil pans no oil will drop on the goods. No belt holes will need to be cut in the floor, and this prevents lint from passing down to the room or basement below. The first expense for belting will be greater; but this will be offset by the longer life of the belting.

It would be better to drive the driving shaft at high speed and use the 10 or 12-inch pulleys. By doing this there will be a more constant speed on the driving shaft and less slippage on the main belt. If there were any slip on the main shaft all the looms would be affected. The main belt can be narrower by having a higher belt speed, and this should also be taken into consideration at the price of leather belting to-day.

Another advantage of the shafting being overhead is that when the belt comes off it can be put on without leaving the room. If the shafting is beneath the floor the fixers would need to go downstairs to put on the belt. Every time the shaft is reversed all the belts will come off. This is a bad feature with quarter-turn drives.

The mechanical superintendent of a large mill replies as follows:

Quarter turn drives, to be satisfactory, must have considerable distance between shafts, and this cannot usually be obtained by belting looms from a shaft below the floor. Short quarter turn drives should be avoided as belting trouble and uneven speeds may be expected. It is realized also that overhead shafting, especially on this kind of work, is not wholly desirable, but under the conditions given would probably be better. Equal size pulleys for driver and driven will prove the best arrangement, but this, of course, cannot always be controlled on account of shafting speeds.

Iron Stains and Test for Iron

We are enclosing herewith a sample of bleached underwear cloth which you see contains strange stains of which we have been unable to discover the cause. When the cloth comes up from the dyehouse there are no signs of any stain. The cloth is kept in trucks, well covered with cloth, and after standing a day or so, a faint stain such as this appears, which becomes more plainly visible when heat is applied when the cloth is dried. We would like to find out the cause and remedy of this condition and hope you can be of some assistance to us. (3062)

These stains are due to the presence of iron. Just how the stain originates is very difficult to state, but the fact remains that it is iron. Our suggestion is to follow the goods through every stage and observe carefully the condition of every place where the goods are likely to remain for any length of time. Examine well the trucks upon which it is stated the goods lie for a day or two; perhaps it is from these that the stains come.

On the other hand, it may be possible for the goods to have iron upon them in a chemical condition that does not show, but which is developed during later treatment. This should be looked into. Carefully spread out the goods, note any abnormal spots, and mark them so that they can be identified after they are finished, and then test them for iron.

The proper test for iron stains is to moisten the suspected spot with a drop or two of dilute pure muriatic acid, and then drop a very dilute solution of yellow prussiate of potash, when, if iron is present a blue coloration will appear. We are returning to you the original sample of your cloth,

showing the blue coloration above referred to, made by the above described test, and which shows that the stain is due to the presence of iron.

In reference to the above reply, a reader sent the following: If a micro-chemical test gives a reaction for iron nothing further is to be said; but the majority of such stains on bleached goods are due to the action of air on the goods while they still contain caustic after kier boiling. The caustic should be displaced by water before exposure to air; otherwise deep brown stains will appear which resist the chlorine. An investigation of this condition might be of benefit to the bleacher.

Dyeing Thread Khaki Color

What kind of dye can be used to dye white thread to khaki color; give full directions for using same? (2934)

Without seeing the shade desired it is difficult to advise with accuracy what to use, also, whether the dyeing must stand the U. S. Army tests. However, the following are suggestions that can be followed: For fairly fast shades, the dyer can use some of the vegetable dyes in suitable proportions, to be ascertained by trials, viz., cutch, flavine and sulphate of copper. Boil in the bath until the correct shade is obtained.

If sulphur colors are permissible, boil out the thread with soda ash, rinse and prepare the skeins by a further boiling with

1 lb. soda ash
1 lb. soluble oil
2¼ lbs. sodium sulphide crystals

adding to the bath suitable proportions of a good sulphur yellow and a sulphur brown. Turn the thread for about 1 hour and finally wash well in a large volume of water and dry, preparatory to dressing.

Dyeing and Finishing Chamoisette

I am having difficulty in dyeing a good black on cotton knitted web used for chamoisette gloves. The writer is a practical dyer and has dyed cotton, silk and woolen goods with various blacks and has always had good results, but in the present case the finishing process through which the goods pass leave the black with a grayish look. This finishing

process is about as follows: The cloth is passed through a heavy glue and then goes through a squeeze roll and is dried on a frame stretcher. After drying it is brushed three times on a brush machine to raise the nap, the brushing machine being covered with emery paper. When the pieces are finished the black looks grayish and so far I have not been able to get the results required. I have received samples of direct blacks from a dozen firms, but all of them are on the green shade. I top them with orange which gives a brownish black, but the firm must have a coal black after the goods are finished. I suppose a sulphur black would be the best to use, but we are not equipped to use it. Will you give me any advice you can to get the results required and give me information as to the best cotton black dye to use and a formula for applying it? I enclose a sample of the goods in the grey. (3122)

There is no doubt but that sulphur black is the most practical dyestuff for this class of goods. The equipment for dyeing is no different from that used for direct black except that all copper, brass and bronze parts of the machinery that come into actual contact with the liquor, must be replaced by iron. A standing kettle may be maintained and a full shade of bloomy black can be dyed, which will be much faster in every respect and increase the value of the finished goods.

Direct black, of the type that is now being made, is subject to several faults. The dyestuff itself is sensitive to acids and alkalies. Alkalies turn it green and acids turn it plum color, and it is only when an exactly neutral point can be attained that the color is satisfactory. At present many lots contain a reddish by-product which has poor dyeing qualities and accumulates in a standing bath. The tendency of most dyers is to add soda to correct this and the result is that the dyeing is really too alkaline, beside being contaminated with the loosely adhering by-product. After a thorough rinsing only a thin slaty color remains.

The best remedy would be to start a fresh bath every day or two and shade the black with just enough Congo Red to change the greenish color of the straight black to a bluish tone, having about 2 per cent. of soda ash in each lot. An excess of Congo Red must be avoided or a reddish black will result. The red is so sensitive to acid that any condition that will turn the black to a red will also turn the Congo Red to a blue-black and the dyeing will seem much faster than it really is.

Good results can also be obtained by using Direct Blue 2B with the black and dyeing a full shade, providing the expense is not increased too much. It is also necessary to ascertain whether the glue solution is neither very acid nor alkaline as so sensitive a dye as Direct Black is very easily affected. Goods that are to receive a finish may be dyed so full that they would dry out bronzy without the finish. Black dyers on hosiery follow this rule, and the public has become accustomed to getting blacks on knit goods that are only possible by over-dyeing the shade and removing the bronziness by a suitable softener or finish.

We suggest as a formula for 100 pounds of goods the following:

7 lbs. Direct Black G Extra
11 oz. Congo Red
2 lbs. Soda ash
20 lbs. Common salt.

Dye at a full boil for one hour, rinse, dry and finish. These figures refer to the average dyestuffs now being sold.

Stripping Color from Hosiery

We are enclosing a sample of knit fabric and would like to have you advise us if there is any chemical that will strip this color. It is made of one thread of white cotton and one thread of black and white worsted, 50/50 merino. The black used is sulphur black. We intend to dye this after it is stripped, if stripping is possible, with a union dye. Therefore, the goods will have to be free from any acid. (2869)

It is doubtful whether the sulphur black could be stripped by any practical method. Hydrosulphite stripping agents, such as blankit and hyraldite, strip the sulphur black, but the color returns on exposure to air. Many sulphur colors can be stripped with chloride of lime, but this would not be advisable in this case as it concerns a half wool fiber.

The black on the cotton is rather weak, so if the inquirer wants to dye the goods a heavy black, it is quite possible to do this with direct black at the boil without stripping. It is, of course, necessary to dye the goods a deep shade of black, otherwise the present color of the cotton will stand out prominently.

A hosiery dyer replies as follows:

"As I understand the question, the thread twisted with the white worsted has been dyed with sulphur black, but the

inquirer fails to state what color these goods are to be dyed after stripping. If these goods are to be dyed with a regular direct black, it would only be necessary to give the goods a hot boil, boiling hot soap bath. This would tone down a black so that the goods could be topped over with the regular direct black without causing much unevenness in shade. If it is intended dyeing the goods some other color, such as blue, brown or yellow, I would advise using Rongalite C. The use of this stripping agent and the method of procedure can be found in any textile chemical book.

Harsh Feel on Piece Dyed Worsted Cloth

I am enclosing a sample of piece dyed black worsted cloth which is very harsh, also a sample of the same quality dyed blue, which was dyed elsewhere and which came out much softer. Could you tell us where our trouble lies? (2809)

The difference in the handle of the two samples is largely due to the difference in the quality and construction. The black sample having the harsh feel is made from a coarser stock, with the filling being much finer than the warp. The warp yarn being twist, and predominating, and being composed of more wiry fibers than those in the softer sample, gives it the harsh handle. The softer sample is composed of shorter and finer fibers, and the filling being about equal in size to the warp, gives a soft feel to the fabric. Both samples have twist warp and single filling and the predominance of warp, together with the more harsh fibers, gives the harsh feel. We could not suggest anything that could be done in finishing that would overcome this difficulty.

A finisher on goods of this character gives the following opinion:

I have examined these samples and have experimented with the harsh sample of black worsted, treating it as follows: I rinsed it out in a glass of lukewarm water and then while wet gave it a good steaming, dried and pressed it, with quite satisfactory results. I would suggest that in handling these goods it would be best to crab in the grease, then wet steam them and wash as usual, being careful to keep the temperature of the warm water low, 115° F. is enough. If a good soap is being used containing the necessary amount of alkali, use cold water for say five minutes after the soap bath. This will prevent the alkali from biting into the fiber, causing a harsh feel.

After taking the goods from the washer give them another wet steaming as before, doing this again after the dyeing operation, and I am quite sure the result will be satisfactory.

In comparing the black with the blue sample, the comparison is hardly a fair one, because the black is weighted more, but if the goods are properly handled this should be scarcely noticeable.

Equipment for a Denim Mill

Kindly let me know what a small cotton mill to make and dye about 2000 yards per 8-hour day of 9-ounce blue denim will cost? I would like to know what the equipment will consist of and how many operatives would be required to run this mill? How much floor space will be required and what amount of horse power will be necessary? What size yarn is required to make 9-ounce denim? (2806)

We do not believe that there is a cotton denim mill in the United States operating with such a small production as 2,000 yards per day, and it is unlikely that a mill of this size could be run successfully on staple goods.

To give the production mentioned, it would require about 1,700 spindles and 35 looms. Assuming the 9-ounce blue denim to be 28 inches wide, 72 ends per inch, 40 picks per inch, 8s warp and 6s filling, the following table will give approximately the machinery required and the other information asked for by the inquirer:

Machines.	Space.	Hp. Required.
1 Breaker Lapper	24 x 8 ft.	10
1 Finisher Lapper	16 x 7 ft.	5
12 Cards	144 x 72 ft.	12
24 Deliveries drawing	42 x 14 ft.	4
96 Slubber spindles	56 x 12 ft.	2
226 Intermediate spindles	68 x 7 ft.	4
1700 Spinning spindles	224 x 26 ft.	30
100 Spooler spindles	24 x 4 ft.	2
1 Warper	14 x 8 ft.	1
2 Single box warp dying	24 x 12 ft.	1
1 5-can dryer	18 x 6 ft.	2
1 Slasher	40 x 8 ft.	2
1 Size kettle	5 x 5 ft.	..
35 Looms	250 x 140 ft.	12
1 Cloth folder	12 x 5 ft.	..
1 Baling press	4 x 3 ft.	..

The cost of this equipment would be in the neighborhood of $40,000, and the weekly payroll would be in the neighborhood of $200. It is rather difficult to give any figures as to the number of operatives and the payroll, as a mill of the size mentioned would be very poorly balanced in the various departments.

Tensile Strength of Cotton Duck

Can you send us a table of tensile strengths of cotton duck? (3050)

There is no such table in existence. Government departments and other consumers lay down their own laws as to the strength tests that fabrics required for particular purposes shall withstand, but for obvious reasons there is no one set of standards. People in the position of requiring information on duck strengths usually have samples tested by competent experts, who can be found in the trade laboratories and textile schools. All results depend on the conditions under which the tests are undertaken and it is important that the factor of relative humidity be considered. The inquirer should secure copies of the publications of Committee D-13 of the American Society for Testing Materials.

Establishing a Hosiery Mill in the South

I have recently been negotiating with interested parties in two or three places relative to establishing a new hosiery mill in the South, and want to secure some information and data along this line, which I will appreciate your giving me.

At present it is my idea to equip a mill for making about 500 dozen pairs per day of 160 and 176-needle goods, some half hose and some women's hose, finishing same. Would like to have your opinion regarding the desirability of this line, or if you think it more advisable to make some other line I would be glad to have suggestions from you as to what line you think would prove more desirable to make. Also in a mill of this size would you advise the making of both half hose and women's hose, or would you advise one line only? If you would advise making one line, then which do you consider preferable for a permanent line? Also would you advise making both 160 and 176-needle goods in a mill of this size, and if not, which do you consider best?

If you consider the line that I have in mind a good one, then I would like some information relative to cost of equipment for a mill of this kind. About how much knitting machinery would be needed and cost of same? Would you

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advise sewing up goods at toes or looping them? How much floor space would be required for knitting department of a mill of capacity mentioned? And for a mill of this size would you suggest a one-story or two-story building?

I would also like to know amount of dyeing and finishing machinery and equipment necessary for a plant of capacity mentioned; how many and what colors you think it would be advisable to make, and whether you would advise using sulphur dyes. About how much floor space would be needed for dyeing and how much for finishing this quantity of goods? About what do you estimate would be the cost of dyeing and finishing outfit for a plant of this size?

In case the plant was operated by steam power, what size boiler and engine would be required for operating the plant, dyeing, finishing and knitting and for heating? Or if electric power were used for driving machinery, what size boiler would be required for heating and dyeing purposes alone? What would be the approximate cost in each case, that is, the cost of equipment?

Can you give me an idea of the cost of making the above class of goods and selling price of same, or about what the net profit would be per dozen. (2843)

The following very complete answer to this question was given by a manufacturer:

With reference to the questions, I would not advise starting a new plant on 160 or 176-needle goods, as the demand to-day is for a lighter weight and finer gauge product. I would strongly recommend the installation of 220-needle machines, inasmuch as this would enable a more desirable and salable article to be made as well as a much higher grade of hosiery.

At the present time, there is no high grade hosiery, such as silk lisles, fiber and thread silks made on 176-needle lines, and although it may not be planned to make a high grade product at the start, yet it is far better to put in equipment that will make high grade goods in case circumstances should demand it. Further, it is just as practical to make low grade goods on 220-needle machines as it is on the 176-needle machines. I can see no reason why 220-needle machines should not be installed.

In starting a mill of this size I would confine it to one line and not complicate matters by making both men's and women's goods. As to which would be the more advisable line to make, this would depend altogether on the labor situation, as it requires a considerably larger number of operatives to make men's goods than it does to make women's goods. Gen-

erally speaking, there is a little better margin of profit on the men's goods than there is on women's goods and the capacity of the machines is also considerably more on men's than on women's goods, resulting in a greater production from the same number of machines, and at the same time reducing overhead expense. Taking all things into consideration I would advise making men's goods, provided, of course, the plant is to be located where there is a good supply of labor.

Cost of equipment changes from time to time but any figures can be checked up with machinery manufacturers.

The following is a list of the equipment and approximate cost of same that would be required for a mill of 500 dozen capacity per day on 220-needle men's half hose:

KNITTING DEPARTMENT.

25 ribbers for rib tops, @ $110.00	$2,750.00
100 knitting machines, @ $165.00	16,500.00
20 looping machines, @ $90.00	1,800.00
2, 5-h.p. motors 1, 3-h.p. motor 1, 1-h.p. motor	500.00
Shafting, pulleys and transmission	400.00
Total	$21,950.00

Floor space for knitting department, 5,000 square feet. Operators, 60.

The following equipment would be required in the dyeing and finishing departments:

2 dyeing machines of 100 lbs. capacity	$700.00
1 bleaching vat, capacity 100 lbs	60.00
1 laundry machine, capacity 100 lbs	200.00
72 hollow steam drying forms, which can be had only on a royalty basis	.....
(By the use of these forms, pressing is unnecessary, thus doing away with press. However, in case pressing seems advisable.)	
1 hot press (can be bought second hand)	50.00
2 ticket machines @ $110	220.00
1 5-h.p. motor	200.00
10 trucks for handling product, at $15	150.00
Total	$1,580.00

The number of operatives required in the finishing department would be as follows:

Menders and inspectors	8
Dyeing department	2
Boarding and pressing	5
Mating, ticketing, stamping, folding and boxing	9
Overseer and shipping clerk	1
Total	25

This would make a total of about ninety operatives, including superintendent, overseer, office clerk, etc.

I would recommend the use of sulphur black, but would use direct colors on the other shades and would advise finishing in the following shades: Black, bleach, tan, grey, navy blue and Palm Beach. The amount of floor space required for dyeing would be only 1,000 square feet. I would recommend a two-story building, 40 x 125, with basement. This would give exactly 5,000 square feet on each floor. I would also recommend a reinforced concrete building so constructed that an additional unit could be added as necessity required.

I would locate the knitting and looping department on the upper floor; mending, boarding, finishing and shipping on the first floor. The mending, boarding and finishing department would require about 2,500 square feet. This would leave 2,500 square feet, or 40 x 62½, for office, shipping and stock.

In the basement would be located the dyeing department, heating plant and yarn storage, also storage of all raw materials for dyeing.

The cost of this building, complete with heating, plumbing, lighting and painting, would be approximately $25,000, not including the land. This I know to be almost exact.

I would not recommend the installation of a power plant for this size mill. It might be well in building to make provision for future power plant, but it would not pay to go to the expense of putting in an engine and generator for this amount of current, as the entire amount of power consumed for driving the equipment would be only about 20-h.p. It would require about 50-h.p. high pressure boiler for heating and furnishing steam and hot water for the dye house. The cost of this is included in the total cost of the building.

The cost of the finished product would, of course, depend

altogether on the class of goods manufactured. The weight of the goods would be about 12 to 14 ounces per dozen, and the cost of the yarn would vary from 40c. per pound to $1.10 per pound, depending on quality. It will readily be seen from this how the cost would vary according to quality. The price of yarns is also abnormal at present.

The labor cost, including overhead expense, would run about 75c. per dozen, as follows:

Knitting dept.	.17
Looping	.08
Mending and inspecting	.05
Dyeing	.10
Board and pressing	.03
Mating and finishing	.05
Boxing	.05
Shipping	.02
Overhead	.20
	$0.75

As to the average profit, this depends altogether upon the efficiency of the plant. There are plants that produce their goods for considerably less than others, and inasmuch as they are all forced to sell their product at about the same price, it will readily be seen that some mills will show a much greater profit than others. However, at the present time there is a shortage of hosiery. There seems to be no set price, and the manufacturer can get about anything he asks for his goods. In normal times these goods show a profit of about 20c. per dozen on high-grade 25c. goods, and about 10c. per dozen on 15c. or cheaper goods.

Briefly summed up, my recommendations would be as follows: Equipment to be for 220-needle line of men's half hose. Total cost of equipment, $23,530. Building to be two stories with basement, of reinforced concrete construction, 40 x 125. Total floor space required, 10,000 square feet. Approximate cost of building $25,000. Total cost of plant complete, $48,530. Number of operatives, 90. Weekly pay-roll, $750. Average profits per dozen, $.20. Total capital required efficiently to operate plant, $85,000.

Direct Black on Cotton Yarn

Can you give me a formula for dyeing direct black on cotton yarn? (2825)

The following formula is used with good success in one mill: The cotton is first boiled out for one hour and then entered in a standing bath with 10 per cent. common salt and 6 per cent. direct black. Bring to a boil in one hour and boil for one hour. Wash at 100° F. Then treat with 4 per cent. formaldehyde and 1 per cent. acetic acid at 100° F. for 20 minutes. Wash at 100° F. This formula produces an excellent shade of black that is fast.

Starting bath. 20 per cent. common salt, 10 per cent. direct black.

Second bath. 15 per cent. common salt, 9 per cent. direct black.

Third bath. 10 per cent. common salt, 8 per cent. direct black.

Standing bath. 10 per cent. common salt, 6 per cent. direct black.

Calculating Shrinkage in Finishing

Please explain the calculations for shrinkage of wool cloth in finishing to bring the finished goods to a certain weight. For example, I am making a carded woolen cloth to match a sample received from our commission house. The sample weighs 14 ounces per yard. I would like to know how to calculate the loom weight and shrinkage in length for this finished weight. (3044)

It will be necessary for this correspondent first to determine the loss in weight during finishing. This varies with the stock and the process of finishing. Let us suppose that this loss in weight will average 15 per cent. Then the woven weight and shrinkage in length are calculated as follows, assuming that the pieces average 45 yards long finished:

45 (yds.) × 14 (ozs.) = 630 ozs. finished.
630 (ozs.) ÷ .85 (100% — 15%) = 741 ozs. from loom.

The piece of cloth that yields 45 yards of 14 ounces of finished cloth must weigh 741 ounces from the loom. Now it is for the manufacturer to decide how this weight shall be obtained; whether by a light woven cloth which must be shrunk in length to give the finished weight required, or by a heavy woven cloth, with little or no shrinkage in length.

Let us suppose, for example, that the manufacturer desires to shrink the goods 10 per cent. in finishing. In such a case the piece, to measure 45 yards, must measure

(45 ÷ 90) = 50 yards woven.

A piece 50 yards long, weighing 741 ounces, would necessarily weigh

$$(741 \div 50) = 14.8 \text{ ounces per yard,}$$

which is the woven weight required to give 14 ounces per yard finished, with a shrinkage of 10 per cent. in length.

If, however, the manufacturer wanted the cloth to shrink only 5 per cent. in length, it would be necessary to make the goods heavier from the loom, the calculation then being as follows:

45 (yds.) ÷ .95 (100% — 5%) = 47.4 yds. woven.
741 (ozs.) ÷ 47.4 (yds.) = 15.6 ozs. woven.

Twitty Yarn from Fine Cape Wool

We are running our cards on a 3 run yarn made principally from fine Cape wool, pulled wool generally. How should the cards be set to get the best results? We find it hard to get a smooth thread. The yarn is full of twitts and does not spin or weave well. (2833)

An old carder gives the following instructions:

Fine Cape pulled wool is one of the hardest stocks to card that there is. I would suggest having the stock thoroughly opened and lubricated; then I would start on the first breaker and see that it is good and sharp and true. I would set the first breaker with a 32 gauge, the first two workers near the tumbler with a 30, and on the second breaker see that it is true and set with a 32 gauge.

On the finisher card I would see that the feed rolls were true with licker-in set as close as possible without hitting the feed rolls; set tumbler to cylinder on finisher to 34 gauge and the strippers to about 32; workers 34. I would also run the workers on the finisher card at different speeds, say 6 inch pulley on first worker; 6½ inch, 7 inch, 7½ inch, 8 inch and 8½ inch, and so on on the others. That would divide up the stock and leave it in good shape for the rings.

See that the fancies are true and not too coarse, also run them very light. It is absolutely necessary on this stock that the top and bottom rings be of the right width, so that the cylinder will not carry back stock that makes twitty yarn; also have them in line. The bottom doffer should be set to the cylinder with a 33 gauge; the top rings with a 32 gauge, and if the top comes heavy or light change the gears, never move the rings in or out. There are change gears which change the weight between top and bottom. Machine builders

always furnish gears with machinery. This stock should spin with a little less than half draft, say 75 or 76 grains, 25 yards on the card; 72.9 grains is 3 run. This can be done by taking a little rub off the roping and making it softer. Have the mules changed to a half draft scroll. I think if the enquirer follows out the above instructions he will have no more twitty roping.

Yarn Breaking in Knitting

Kindly advise me what method is used in knitting 2/60 combed peeler natural lisle to get the best results. That is to eliminate drops, and the breaking of the yarn and running off of quarters. The machines on which the yarn is knitted are 14 cut Cooper spring needle and 14 cut Wildman latch needle. The greatest trouble seems to come from quarters. The yarn being stiff and more or less wiry, draws off from bobbins or cones in knitting in such a way as to have it wind around parts of the take-up and catch and break. It seems to me, mills that run a great deal of this yarn must put it through some liquid or softening solution, in order to get results and have it work more like soft single end yarn. If you can give me any information it will be appreciated. (2871)

Running 2-60s lisle over oil on the winder will prevent loose fibers from twisting into other fibers on the bobbins. This, in turn, will prevent the sudden snaps or breaks in the yarn. I had more or less trouble in running the larger sizes on 2-60s and 2-70s lisle and mercerized yarn, until I began running the yarn over an oil solution (olive oil and soap). This laid the fibers closely and, provided it did not stand too long, the yarn would run very well. This was done only with a Wildman machine. For the Cooper machine a sort of oiled tension rag wired in a convenient place will generally hold stiff, wiry yarn in place. If the yarn is on cones, have the thread guide hole as near the cone as possible. This tends to throw the yarn away from the cone when running, thereby dodging the knots. This is possible if a wire arrangement fastened under the stands and bent to suit conditions is used.

The drop stitches are due to several reasons. The yarn being hard and stiff, tension should be given to hold it straight. There should be no rough spots or cuts at any point where the yarn touches. Outside of this I can give no further advice unless it be in the adjustment of the frame, as 2-60s lisle and 14 cut frames need a thoroughly experienced knitter who knows all the fine points of adjustment. I do not know what the inquirer means by "catching and winding

up in the take up" as I have never had this occur in my experience.

Length of Wool Half Hose

Are merino and wool socks manufactured in standard lengths? We have had a number of buyers in the trade try to tell us that our very heavy weight socks, such as we are making a specialty of, ought to measure 17 inches from the bottom of the heel to the welt, and that our boxed goods, or light weight bundled goods, should measure at least 15 inches between the same points. How a mill making various mixes of wool and cotton in different percentages can produce a varied line of wool and merino half hose and expect them to finish up the same length, even if they start the same length on the machines, owing to the variation in shrinking, is beyond me. (3041)

It is practically impossible to guarantee a uniform size when yarn is uneven. Pairers and folders do the best they can, and do well as a rule. If getting out sample stock, for instance, the pairers may go through 10 or even 20 dozen to pair off a sock before getting just what is wanted. Get a standard length and keep as near as possible. We are not prepared to give actual measurements. The demand of buyers must govern that.

Moisture in Artificial Silk

Can you give us information as to what the natural percentage of moisture in artificial silk is? (2774)

The percentage of moisture in artificial silk is about the same as found in real silk, varying between a little over 9 and 13 per cent. The average is taken as 11 per cent., and this is used as the standard, the same as for natural silk.

Dyeing Plant for Jersey Cloth

We would like to know what machines to purchase for the installation of a dyeing plant to dye worsted and woolen materials which come in approximately 50-yard lengths and are known as jersey cloths. (2770)

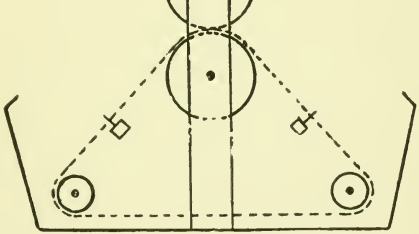
The dyeing plant for this class of goods consists essentially of suitable dye kettles, whizzers and a dry room. The dye kettles are usually of the ordinary tub type, comprising a tub, with a partially curved lower portion, and rectangular in plan, surmounted with a winch of such size as will keep

the cloth in fair motion. For pieces running about 50 yards each there should be no difficulty in operating machines built for six or more pieces at one time. Such kettles should be of not less than 1,000 gallons capacity, and allow freedom for additional liquor, if necessary. Without knowing more definitely the size of the proposed dyehouse or the amount of material it is proposed to handle per day, a more complete statement of the equipment is not possible.

Bleaching Turkish Towels

Please give us the following information as regards bleaching Turkish towels with the chloride of lime process: First, what is the best form and type of washing machine to use to wash the goods after chemicking? Is it necessary to wet down the goods and use any of the scouring preparations before boiling? Can a good boil be obtained by running the goods into the kier dry? Please give a good boiling formula for these goods. Second, after the goods are boiled, how is it known that a good and sufficient boil has been obtained? What degree twaddle of chlorine is recommended for the chlorine bath and how long should the goods remain in the chemic? Is it desirable to use soaping in any of the washing processes? What is the best method of bluing the goods in rope form? (2842)

The accompanying illustration shows what the writer has found to be the best type of washing machine. The squeeze



WASHING TURKISH TOWELS

rolls over the center of the box are 8 or 9 feet long, 20 to 22 inches in diameter. The rolls in the box are about 8 inches in diameter. If the inquirer intends to run two

ends in the bleachery I would advise nothing less than 10 foot rolls; if he is only going to use one end, 8 foot rolls will do; with a square bar on each side of the nip with pegs set in at convenient distances to prevent the cotton from overlapping in the machine. With a machine of this description and plenty of water there is little danger of not getting a good wash.

Regarding the process of bleaching Turkish towels, I presume there are red headings or borders which have to be protected, so I will answer the several questions casually and then give a thorough process for the treatment.

It is not necessary to scour the Turkish towels unless they are to be shipped out in the scoured form. It is customary to wet out and scour white cotton piece goods before a caustic boil; a good boil cannot be obtained by running the goods in the kier dry. To find out how a good and sufficient boil has been obtained is knowledge gained by experience; the result can be seen immediately the goods touch the chemic.

What degree of chemic is used and the length of time for the goods to remain in the chemic bath will all depend on the quality of the goods and also upon the boil. This knowledge will have to be gained by experience, although the strength of the chemic to be used will vary from 1° to 2° Tw. It is not necessary to use soaping in the washing process. If a soft feel is desired this can be obtained at the same time that the goods are blued.

The best method of bluing in the rope form is to have a long box in front of the squeezers about 8 feet long, and a mixing tub for the blue solution with a valve to let out the mixture into the box or trough. In the box are about four rollers and the end is passed over one and under another. It is drawn from the front end of the box and right through the squeezers, the bluing being replenished from the mixing tub. I have used this method of bluing in the rope form for a good many years with entire satisfaction. Of course, the squeezer must be kept in good condition for squeezing the goods as they pass through.

Details of a process for a bleach, with the boiling formula for a Turkish towel with red headings and borders follow. If the towels have no headings they could be given a caustic boil. Saturate the goods into the kier by passing them through the washer, run them into the kier until they are about 2 feet from the top. Then cover the goods with bur-

lap, and if the kiers are high pressure leave off the lids and put in wooden blocks up to the top of the kier to prevent the goods from turning over.

In the mixing pan or kettle make a solution of 3 per cent. soda ash; for every 100 pounds of cotton allow 3 pounds of soda ash, and if a soft feel is desired, add 1 per cent. of soap or bleaching paste. Boil for 9 or 10 hours without the covers on. If there are no headings on the towels boil for 9 hours at 15 pounds pressure of steam. When boiled, run the goods out and pass through the washer and give a chemic bath of 1° Tw. Run the goods in small piles and keep a watch on the headings. Let them lie in the bath for about 3 hours and if not white enough then, they must be washed back into the kier and given another boil with a 2 per cent. solution of soda ash and boiled for another 9 hours. Then wash out of the kier and give the goods a chemic bath of ½ to 1° Tw., letting them lie for four or five hours until white enough, after which the chemic bath is washed off. This process does not give the goods a clear white appearance, but if this is desired they must be given an acid bath of sulphuric acid at ½° Tw. This must be done very quickly or the headings will be affected.

If the towels have no headings or borders and are plain white Turkish towels, I would recommend the following process: Saturate the goods at the washing machine and give them a sulphuric acid bath at from 2° to 4° Tw., according to quality of towel and length of time they are permitted to lie in the bath. If they are a medium towel, give a 2° bath letting them lie for three hours; if a heavy towel, give them a 4°bath and let them lie for four or five hours. Care must be taken not to let any of the laps get dry, otherwise tender cloth will result. When the goods have aged the required length of time, wash them free from acid into the kier and give them a 2 per cent. to 3 per cent. solution of caustic soda and boil for 9 or 10 hours at 10, 15 or 20 lbs.

Wash the goods thoroughly from the kier and give a chemic bath of 2° Tw., letting them lie for three to four hours; then wash off the chemic and give an acid bath at 1 to 1½° Tw., when they are ready for washing. If a soft white towel is required, I would advise bluing and soaping the goods at the mangle, as a more uniform result will be obtained. Instead of using all soap, I would advise using a solution of one-half soap and one-half soluble oil. Mix this solution in the following proportions: To 100 gallons

of water use about 25 pounds good soap and about 5 gallons of soluble oil, bluing to shade required. If a better feel is desired, add from 25 to 30 pounds of wheat starch and boil for 8 minutes. Pass the goods through this solution at the mangle, and the result will be a good feeling towel without any traces of assistance.

Black Oil Spots in Weaving White Goods

We are manufacturing white cotton goods which are dyed in the piece and have been experiencing considerable trouble with black grease marks, caused by the oil flying from the picker spindle. Can you recommend a remedy for this? (2787)

We assume that what is wanted is a method of stopping the throwing of oil from the loom picker spindle to the cloth. Possibly a leather bunter is used on the picker spindle or a piece of an old picker. If this is the case, we would recommend that a bunter be used made from an old cloth heading, rolled up as hard as possible and put on the spindle. This will absorb the oil, also the shock of the pickers. Possibly the weavers are oiling the picker spindles too freely. Where this trouble has occurred, it has been found a good plan to have the loom fixers or some other responsible person oil the spindles. If the weavers are to continue this oiling, they should not be allowed to oil the spindles direct from the oil can, but should saturate a piece of waste and rub this on the spindle.

Storing Worsted Yarn

Please give us some information regarding the storage of worsted yarns in oil. We expect to carry a large quantity of this yarn for about eight or ten months, and as we have had no experience in this line, would like to know just what should be done with the yarn so that it will be in the best condition when we come to use it. This yarn is spun and skeined all ready to be sent to the dyers. (2961)

The best way of storing worsted yarn, if it is to be kept for a long time, is to store it in a blind storehouse with the floor not touching the ground. By having a blind storehouse the yarn is in a better atmosphere for conditioning, and is not subjected to conditions which take moisture from it, making it brittle and hard to handle. We would also advise using some naphthaline (tar camphor) to keep the moths away,

sprinkling it all around the edges of the pile of yarn and also between layers.

A superintendent sends the following: Bundle up the worsted yarn in the usual form and pile up in a dry room on a platform a few inches from the floor. Do not let the yarn touch the wall. Every week throw powdered camphor on the yarn, which keeps it from being moth eaten.

Edgar A. Murray Co., Detroit, Mich., writes: We manufacture a moth preventive called Moth Doom which is successfully used in many woolen and worsted mills. It is a liquid which is to be sprayed on yarns in the same manner as you advise the use of naphthaline. It not only keeps the moths away from the goods in storage, but if the moths have already deposited their larvæ on the yarns or other goods, the Moth Doom will kill this larvæ, which is the real destructive agent. Naphthaline, while it will undoubtedly keep moths away, cannot destroy the larvæ, so would not prove of much use if the yarns or made up clothing had been infested before being stored away. The following concerns are some of the many satisfied users of Moth Doom: Albany Felt Co., Albany, N. Y.; Isaac Baker & Son, Erie, Pa.; Magee Carpet Co., Bloomsburg, Pa.; Cleveland Worsted Mills, Cleveland, O., and many of the mills of the American Woolen Co. We have a descriptive circular describing this preparation, and are glad to send it to persons interested.

Simplifying Method of Paying Weavers

We have recently started a double force of hands in our factory and have been having some trouble keeping the work of the piece workers correct. We make twenty blankets in a string, and a weaver cannot weave twenty blankets in eight hours, thus making it necessary to make two or three and sometimes four divisions of one string of twenty blankets. We pay the weavers a stated price for each blanket in the different sizes, and when shifts are changed a weaver may be in the middle of a blanket, or may have some larger or smaller fraction of a blanket woven. We would like to know of a good and accurate method of keeping account of this kind of work that will not demand too much work in measuring and listing each weaver's work. (2792)

It is our opinion that the inquirer is asking something that is impossible. As long as he has a double force and pays the weaver by the blanket, the blankets or parts of a blanket must

be measured and booked and figured accordingly. We should think the easiest solution would be to figure out a weave-room price list and pay the weavers by the yard in the same proportion as they are now paid by the blanket. Then each string of blankets could be measured for the yards that each operator weaves and the number of yards multiplied by the weave-room price list. This would simplify figuring each weaver's pay.

Mill Wrinkles in Wool Goods

We are troubled with wrinkles in wool goods, shown in the sample. I tack them and run through a soaping machine with warm soap, run in the fulling mill three double, which gives 18 to 20 yards around. I then take them out and shake and change the ends two or three times. The soap seems to be of good strength and starts the grease and they lather well in the washer. (2906)

It is evident that the trouble is due to excessive felting in streaks. The wrinkle marks which show in the goods are doubtless due to the cloth running in the fulling mills continuously in the same folds or wrinkles, causing increased warmth and, consequently, more felt where these wrinkles occur. Anything that can be done to break up this tendency to sameness will be a benefit.

Upon holding the goods to the light and looking through, the extra compactness of the cloth where these marks occur can be plainly seen. Where there is more felt there is bound to be more nap when finished, whether napped wet or dry. We find that 2 inches in width, where these heavily-felted streaks occur, contain five more warp threads than where the marks show the least, and that the heavy part weighs six-tenths of an ounce more per yard.

There are several conditions that may tend to cause these wrinkles. By calling attention to these, a way out of the difficulty may be found. The use of warm soap is wrong, as it gives the cloth a certain warmth that may be retained only in the folds or wrinkles, so that the fulling begins more promptly in these places. Cold soap gives a uniform temperature to start with, and all parts of the cloth have an equal chance, as the warmth is generated in the process. Care should be taken that the cloth gets sufficient soap, with no dry streaks in starting.

If the ends of the cloth are stitched together by hand, too coarse or irregular stitches will produce wrinkles, and the

use of a sewing machine will obviate this difficulty. We are of the opinion that running the cloth three double, with only eighteen or twenty yards around, is not only crowding the goods too much, but gives little chance for it to change its position or folds as it passes around. If there are no guide holes or bars for separating the three strands as they come up from the bottom of the mill, the cloth must run continuously in the same folds, and the confined portions get increased warmth, and in consequence more felting.

Fulling mills are built for running the cloth double, with guide bars for separating the two strands as they come up from the bottom of the mill. By the use of these separating bars the strands pass into the rolls side by side, and cross each other just before entering these guides. The strand at the right passes to the left guide, and the one at the left to the right. This tends to change the position of the folds in the process.

Rolling selvages will cause mill wrinkles of the worst kind along the sides of the cloth, and as the sample shows them more at the sides, we infer there may be an inclination to rolling in this case. Goods constructed with a preponderance of filling on one side, as these are, nearly always roll toward the filling side. This may be remedied somewhat by tacking the selvages with the filling side out, so that in their tendency to roll they hold each other from doing so.

There is a possibility that the pressure of the top roll of the fulling mill may be too great. Loosen up the springs just enough to steady the roll when there is no cloth in, and the pressure will be sufficient when the goods are run double. Extreme pressure tends to crush the wrinkles so that they become set and resist a change of folds.

Knots Used in Mohair Spinning and Twisting

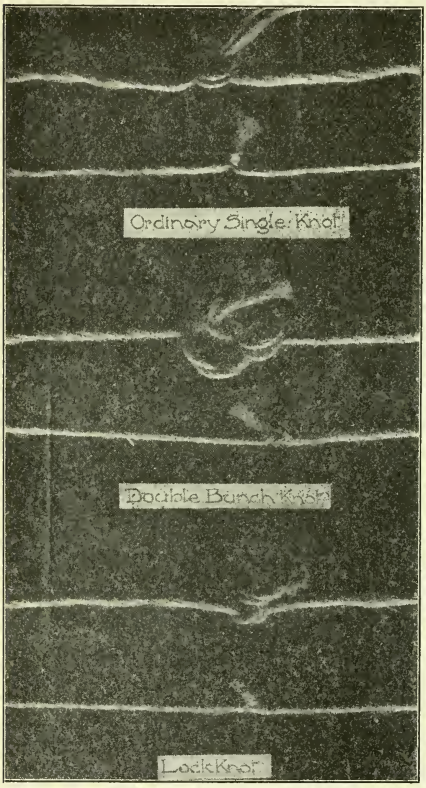
In your issue of March 17, in the article on mohair fiber and yarn production, you state that special knots are used in uniting the ends of mohair yarn. Could you send us any sample knots, or sketches, or information so that we can make the most practical kind of knots in the mohair yarn we are using? (2911)

The illustrations show some of the most important knots used in mohair spinning and twisting.

Ordinary Single Knot: This type of knot is easily and quickly made and is employed in uniting ends in the spinning and twisting processes where there is only a

slight tension imposed on the thread before it is united with another.

Double Bunch Knot: This is composed of two single knots and is easily constructed, strong, firm and entirely reliable. It will be noticed that the knot is all on one side of the thread, and, therefore, only usable where there is plenty of room in the mails of the loom.

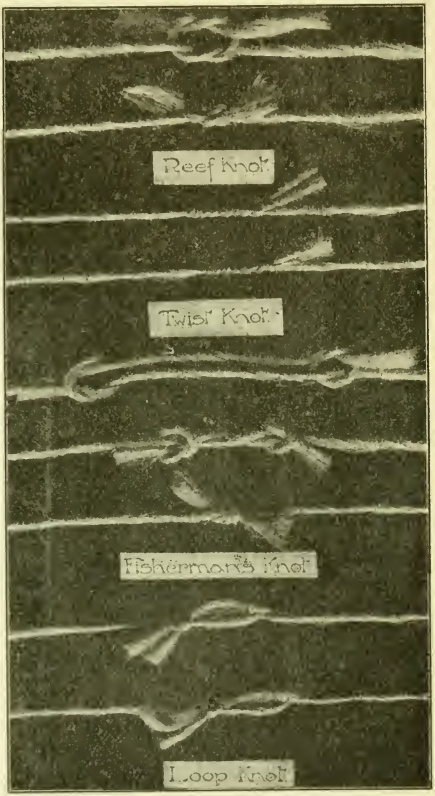


Lock Knot: This is a very satisfactory end holder. It consists of an ordinary single knot with a half knot at the back, the latter being formed first. The tighter the yarn is drawn, the firmer the half knot controls and grips the ordinary single knot. Its disadvantage for some weaves is that it bulks largely on one side of the thread.

Reef Knot: This is a very useful type of knot as it surrounds the thread more uniformly, and where it is employed in warp threads can more satisfactorily work within a small space.

Twist Knot: This is a type of knot of exceptional value and is in extensive use. Some skill is necessary to construct it properly, but when practice has given the required dex-

terity it can be made as quickly as any other compound knot. It is made by twisting the two ends to be united around each other until they assume the form indicated in the illustration, and then slipping a half knot over the two tail-ends close to the finishing end of the twisted portion. Any strain imposed tightens the half knot, firmly holds the tails parallel to the length of the thread and prevents the twist of the knot from unrolling. When correctly made it is very serviceable, and the fact that the end opposite to that carrying the binder knot is hard twisted, pointed and small in diameter and always arranged in the warp so that this pointed end goes first into the loom, its value for mohair plush goods is very great.



Fisherman's Knot: From the three illustrations given of the manner in which this useful knot is constructed, it will be noticed that it is partly over and partly under the line of the yarn and therefore, when completed uniformly surrounds the thread and occupies the minimum space. For this reason its use is extensive, and although it takes a little longer to construct than some of the foregoing, its efficient grip

and neatness is ample compensation for the labor entailed.

Loop Knot: This type of knot is very popular because of the ease and quickness with which it can be made. It consists of the ordinary single knot with the addition of a half knot thrown over the two tail-ends to hold them parallel to the line of the thread and prevent any slippage. Reliability, simplicity and neatness are combined and its serviceableness is beyond question. It will be noticed that the tighter the half knot controlling the tail-ends is drawn the more efficient will the knot become. This is especially useful in working pile fabrics.

Cotton Grades and Yarn Sizes

Kindly advise what style, grade and staple of cotton is used in the spinning of the Eastern peeler yarns, for which you quote prices on page 60 of your Dec. 30 issue.
(2837)

In quoting Eastern peeler or other yarns, we have no knowledge of the style, grade and staple of cotton used, but are guided in our collation of prices by the character of the yarns themselves, and in all cases we endeavor to obtain average prices for good grades of yarn.

We can give you what we understand to be the style, grade and staple of cotton used by leading Eastern spinners for good grades of Eastern peeler weaving and hosiery yarns, both carded and combed, and it is probably safe to assume that our quotations are based on yarns spun from such cottons. For skeins and warps the best Eastern mills would use "Rovers" of middling to strict middling grade as follows: Up to 26s, 1 to 1/16 in. staple; 26s to 36s, commercial 1⅛ in. staple; 36s to 46s, 1⅛ to 1 3/16 in. staple; 46s to 56s, commercial to full 1¼ in. staple; 56s to 70s, full 1¼ to 1 5/16 in. staple; 70s to 90s, 1⅜ in. staple. It may be stated that for 26s to 36s some spinners prefer to use a North Texas cotton of what is known as "export staple." Any of the cottons named will give a standard break with proper preparation.

For hosiery yarns a lofty or full cotton of good color is used, of strict to good middling grade, with 1 to 1 1/16 in. staple for counts up to 20s, and 1 1/16 to 1⅛ in. staple for 20s to 40s.

Sizes for Silk Thread and Braided Cords

Please advise us whether there are standard sizes used in the trade for silk thread and for cord which has been twisted

or braided or both twisted and braided. Also what method is used for describing the size and construction of such materials? (2773)

The sizes of silk threads are based upon the yards per ounce. When the yardage per ounce is determined it is given a letter, thus:

1500	yards	per	ounce	is	called	OO
1200	"	"	"	"	"	O
1000	"	"	"	"	"	A
800	"	"	"	"	"	B
600	"	"	"	"	"	C

and etc. This is the standard schedule, but if a thread upon completion runs 1050 yards per ounce, it is called A; the same if it runs 950 yards, it being nearer the A size than either the B or the O.

Braided cords are numbered by the number of carriers of the machine producing the cord, which is, of course, identical with the number of threads except where multiple threads are used on the spools. Thus, a 16 carrier braider cords with 16 threads, or with 32 threads if each spool held two threads, or with 48 threads if each spool held three threads. All these cords would be designated as 16 carrier cords because of the 16 carriers or spools on the braider. The diameter of the cord is a matter entirely independent of the number of threads and is generally designated either in m/m or inches and measured by micrometer or gauge in the same way as any other round article like wire would be measured. It will be readily seen that a 16 carrier cord might have a diameter of 1/32 inches if it were made of fine thread, or it might be ⅛ inches in diameter if it were made of coarser thread, or a number of fine threads to each carrier.

Equipment for Bleaching Cotton Goods

We are contemplating bleaching cotton piece goods in the gray for our own use, but are not equipped to do this kind of work; therefore wish that you would advise us the most practical way to go into this matter, and what equipment would be necessary to handle about 1,000 yards daily? (3034)

The proper course for this inquirer to follow is to engage the services of an experienced bleacher and place him in

charge of the proposed bleach house, and then get in touch with the builders of the proper machinery. As a matter of fact, 1,000 yards of gray goods to be bleached daily is very small, and unless it is proposed to greatly enlarge the plant in due time, it might be better to send the goods to be bleached to a regularly equipped bleach works for the time being.

Since the inquirer does not indicate the average weight of the goods it is proposed to bleach, we will assume an average weight of 8 ounces per yard, or about 500 pounds per day. Even with a small contemplated output, there are certain items that go to make up the equipment of a bleach works and which cannot be omitted. A small bleach plant will comprise, in the main, the following: A gray room for the storage of the goods to be bleached; singeing room, equipped with a single plate singe stove, heated by direct fire or by means of gas; one kier. This latter is the most important part of the equipment, and if not selected according to the kind of work it is intended to do, the plant may not be as efficient as it might be made. There are only two kinds of kiers, open and closed, each has its advantages, and it is only with a knowledge of the goods to be bleached that a recommendation can be made. Kier boiling varies as to time, but the strength of solutions used is about 1½ degrees Tw., and used in the proportion of about 60 to 75 gallons for each 100 pounds of cloth. This figure should not be deviated from very much.

From the kiers, the goods travel to the washing machine, and finally to the bleaching liquor vats, where they are subjected to the action of chloride of lime liquor standing at 1¼ degrees Tw., for from two to four hours, then pass through the sours, which are made by diluting sulphuric acid to 1 to 1½ degrees Tw., and then are washed so well that no traces of acid remain in the goods.

From the washing machine, the goods pass on to the spreader or scutcher, thence to the water mangle, and are then dried over steam cans, or on one of the more modern machines for drying piece goods. If the goods are to be calendered there must be added a costly machine for this purpose.

Not knowing anything about the goods to be bleached, or the uses to which they are to be put, leaves us in doubt as to just what is wanted, and, consequently, our recommendations may not prove of as much assistance as they otherwise might.

Condensers or Gauze Rooms

We are interested in the installation of rag pickers and garnetts and the question has come up as to the advantage of condensers on the rag pickers in preference to gauze rooms or bins into which the stock is blown direct from the rag picker. I would appreciate any information relating to this question. (2909)

There are several advantages claimed for the condenser system on rag pickers; the stock being rolled up in balls or laps, it is easier handled than when blown into a gauze room where it has to be bagged up, requiring extra labor. It is also claimed that the condenser system is an advantage on pickers as it allows an even distribution of the fibers, the stock as it leaves the pickers being confined to a small area. The lighter particles of shoddy do not become so far separated from the heavier particles that naturally fall near the mouth of the picker. Also where there is a limited amount of room, condensers are found to be an advantage. Then again, the claim is advanced that the gauze room is to be preferred as the shoddy is more open and lofty for mixings, the claim being that when the shoddy is rolled into laps it is very compact, making it necessary at times to run it through a machine for the purpose of opening or breaking it up previous to mixing with the lots. The advantages derived from condensers in the matter of convenience of handling the stock from the picker, make them a decided preference.

Another correspondent says: I prefer a gauze room, although we have our shoddy pickers here rigged up with a fan, piped from the back side. I think with a gauze room where you have one or more pickers, it mixes the stock up even and blends better. Where there are several kinds of rags used it has an advantage in giving a more even mixture.

Cotton Production, Consumption, Etc.

Kindly advise me if there is any book published giving a summary of cotton production, consumption, etc., in graphical form. (2836)

There is no book published with which we are familiar giving a charted summary of cotton production, consumption, etc., but such charts are published by several cotton firms and that of A. Norden & Co., New York City, is probably the most satisfactory.

The most complete statistics of cotton production and consumption are contained in a bulletin of the Department of Commerce, entitled "Cotton Production and Distribution"; this for the season of 1915-16 is Bulletin No. 134 and can be obtained by addressing the department.

"Cotton Facts," published by the Shepperson Publishing Co., Cotton Exchange Bldg., New York City, is also an exhaustive work on the same subject and can be obtained through our book department if a copy is desired.

Sizing for Shoe Laces

Please give us a formula for a good sizing for glazing shoe laces. The sizing we are using now does not give the luster required. (2845)

Shoe laces are sized with gelatine, which has been applied from a hot solution, but containing only a small amount in solution, and then dried over cans. Laces are also sized with a solution of caseine. This product produces the best sizing, but it should be prepared with care. The caseine is dissolved with the aid of borax or ammonia to form a weak solution, and then the laces are immersed or passed through the liquid and dried. Caseine sized laces are lustrous, and have the added property of being, to a marked extent, waterproof.

There are some laces on the market that have a very high luster and a fine springy feel. We do not know how these laces have been sized since the manufacturers of them have not taken us into their confidence in such matters, but if the inquirer will send a sample of the lace he wishes to imitate, we will endeavor to ascertain what kind of size was applied. At least one dozen pairs of laces is not too much for such a test.

Cream Tint on Cotton Knit Goods

We are sending you two samples of cotton cloth marked Nos. 1 and 2. No. 1 is a finished cotton fabric which is treated in some manner to make it appear creamy or yellowish and very much like an all-wool material. No. 2 is a piece of the same goods after being scoured in the usual laundry way, and it has become quite white again. Please advise what treatment this fabric has received to give it such a nice creamy woolen appearance. (2730)

The easiest way to obtain this creamy color is to tint the goods with aniline colors. The shade can be obtained with

a mixture of direct yellow, brown and black. The sample submitted is not large enough to determine whether it has been tinted with aniline colors. It is possible that it has been treated with the "Egyptian tint." The sample has further been treated with some sort of a wax or stearine.

Usually aniline colors do not wash out as easily as did the color on sample No. 2. When tinting the white with aniline colors, only very small quantities will be required. It is, therefore, best to weigh off the proper proportion of the different dyestuffs and then mix them with enough fine salt in a glass jar for each 100 pounds of material, so that ½ ounce or 1 ounce of the mixture will be required to get the shade. Then there is no chance to make mistakes and the different batches will come out alike.

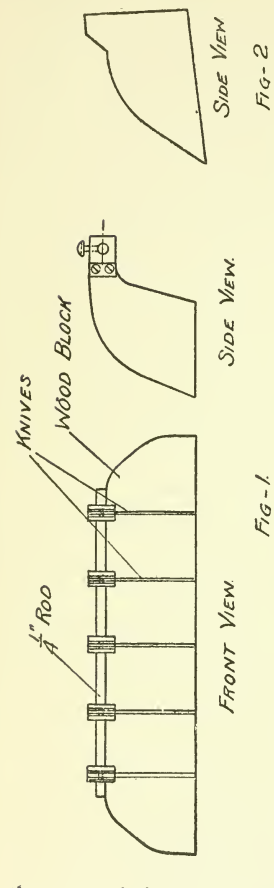
The following formula for cotton knit goods to give the desired creamy appearance is recommended by another correspondent: For 100 lbs. of goods, use 60 grains of Diamine Orange B and 40 grains of Diamine Yellow B, dissolved in boiling water and strained into a 3 per cent. soap solution. The goods are entered and worked for 20 minutes at a temperature of 120° F. I have obtained the same finish on unbleached goods that had been boiled for 6 hours with 4 per cent. of caustic soda, using 50 grains Diamine Yellow to 100 lbs. of cloth.

Slitting Attachments for Knitting Machines

A recent inquiry for a slitting attachment brings to mind several devices which the writer has used or has seen in use in various mills. When fleeced lined men's goods were a favorite on the market, a ribbed cuff, doubled, was used. This cuff was generally made on a small four or five-inch cylinder. Many mills not having these small sizes, used the regular latch needle ribbed frame with a slitting attachment. The writer at one time had about ten of these large sizes on cuffs and produced about 2,000 dozen a day of 24 hours.

A 20-inch knitting machine had five sections, a 16-inch machine had four sections. There were two each of dial and cylinder needles left out as the cutting mark between the sections. A block of wood was set inside the cloth on top of the take-up rollers and along the top of this block there was a quarter inch iron rod, which held slitting knives in exact position. These knives were similar to the safety razor blades of to-day. When the knives were set to cut at

the mark, the frame was started, and the straight stitches were severed as they were drawn over the knives and through the rollers of the take-up. Fig. 1 shows a single knife and the manner in which the knives were attached to the wooden block.



OTHER STYLES OF SLITTERS

Another style of slitter is shown at Fig. 2. This is a simple and effective device and was used in Utica for many years. The exact division points were found in the cylinder and a knife attachment was set into slots, somewhat similar to the regular dogs that hold the dial in position. The knives could be taken out and sharpened by simply pulling them up out of the slots into which they are fitted.

A THIRD STYLE

A third style was similar to the first, but the fabric was cut by a knife attachment on a wooden block in front of the rollers on a spreading machine. The work was done by some careful man who could keep the wales straight in the roller.

Still another idea consisted of a long knife needle being used in the dial where needles are left out for the division. This knife was nothing more or less than a needle longer than the regular needles, with the needle shaft ground to a razor edge. The working in and out of this needle knife cut the threads as fast as they were knit. This latter idea was not much of a success on fine work, for the cut edges would curl and run double into the take-up, releasing the other sections and causing a smash.

Setting a Worsted Card

How would you set a 2-cylinder, 4 licker-in card for ⅜ blood and ½ blood? What gauge would be used to set lickers-in and feed rolls. Also would you start to come closer between first top divider and licker-in and keep coming closer until you come to the first cylinder? Would you set all the workers on the first cylinders with the same gauge, also how about the workers on the second cylinder? What is the standard weight of 5 yards of sliver from the card for ⅜ blood? ½ blood? What is a fair production for a 60 x 60 inch, 2 cylinder, 4 licker-in card for ⅜ blood? for ½ blood? Would you run ½ blood wool after ⅜ blood on the same card without resetting the workers and get good results (good sliver free from pea lumps or neps)? I would also like to know some particulars about setting a card for high ¼ blood and low ¼ blood wool. Would it be better not to have so much preparing on a card for high and low ¼ blood wools, say to have 2 lickers-in instead of 4 lickers-in, or does the preparing (lickers-in) make much difference. (2812)

Answering the first, second and third questions, the distance between the feed rolls and first licker-in may be from ⅛ to 3/16 inch, according to strength of stock; the distance between first divider and licker-in, about 1/16 inch, gradually decreasing the space until at fourth licker-in a 20 B. W. G. passes between the divider and fourth licker-in. First workers on cylinders, 22 gauge, gradually getting closer at each worker. Set the angle stripper close to, but clear of first cylinder. As the cylinder and fancy work smooth side to smooth side, the fancy should just touch the cylinders so as to raise the stock on the cylinder ready for taking off by doffer. This is allowable, as the extra surface speed of fancy tends to keep the points of both cylinder and fancy in good point. A good test is to so set fancy that when working it can be heard coming in contact with the cylinder. If set too close the result is a knotty, neppy sliver, and if too far away, the cylinder is not cleared and does not have a chance to properly comb the stock. The cause of neps when set too close is due to the stock being lifted too far out of wires on the cylinder and then coming on to doffer doubled, the stock catching at the middle instead of at the ends of fibers. Begin with the first worker on second cylinder, set at 28 B. W. G., following up to 32 and 34 on last worker. The rule is to work as close as possible without breaking the fibers. If the rollers are set too far apart, especially between doffer and angle strippers, there is a

tendency to curl the fibers, resulting in neps and knots.

Answering the fourth question: there is no real standard. In these qualities it varies from 2½ to 3 ounces per 5 yards, according to growth of wool. But it is all important that all cards on the same lot of stock should deliver the same weight per yard, or it will be impossible to turn out a standard weight from the backwasher or any subsequent process.

Fifth, a fair 10 hours production varies from 350 to 450 pounds, depending on conditions.

Sixth. Yes, with rather a closer setting of workers on second cylinder.

Seventh. Just a gauge thicker for ⅜ blood than for ½ blood.

Eighth. If there are signs of working too hard, resulting in breaking of fibers, work rather more open, and slightly slow down speed of first and second lickers-in, but do not knock out a licker-in, as their function is to open the stock, and four processes are better than two or even three. The setting of the lickers-in and the proper speeding of same for heavy stock, must be left to the carder's judgment, and each separate lot must be judged on its merit.

Knitting Silk Jersey Cloth

I enclose a sample of silk jersey cloth. Can you inform me on what kind of a machine this was made? (2856)

Upon a close examination of the sample submitted, we find it was made on a circular spring needle knitting machine, and is knit the same as some kinds of worsted jersey cloth, two threads in a stitch. Builders of spring needle knitting machines are listed in the advertising columns of the TEXTILE WORLD JOURNAL. The sample is made with 4 to 6 feeds on a machine, according to the diameter, and about 16 needles to the inch, and is called a silk jersey cloth.

Emulsion for Dyed Yarn That Will Not Stand Washing

Having had to use a low grade of worsted yarn on spring-needle jersey machines, we discovered that it was impossible to knit it unless the yarn was run through an emulsion. In order to knit this yarn we found it necessary to apply a large amount of "soup" which contained a large percentage of oil. The yarn being made from dyes which did not stand washing, the goods naturally went through in an oily state, in some

instances so oily that boxes were stained. Is there any good solution which can be made that will disappear from the goods and still leave the yarn in a knitting condition? (2796)

There is no solution that can be applied to meet the peculiar conditions named above. It is unfortunate that the dyes used do not permit being washed. Wherever there is any appreciable quantity of oil on worsted, unless it is thoroughly removed, it will make its presence known by offsetting on any other material next to it. There is no volatile lubricating substance that is available for this work, and in order to overcome the present difficulty, why not make use of dyes that will stand washing?

Another correspondent suggests running the yarn between paraffin discs which will give sufficient lubrication to the yarn to make it run smoothly through the needles. The two discs of paraffin can be made by pouring out in a pan say to ⅜ inch thickness, and using a tin ring of the size desired for cutting out when sufficiently cooled. There must be a sleeve over the spindle with a narrow bearing on each end to reduce the friction, the holes in the disc being just large enough to pass over the sleeve. A tin disc should be on each side of the paraffin disc to act as a bearing for the springs, keeping the paraffin pressed to the yarn when it passes through. The paraffin discs can be used instead of the ordinary tension discs on winder. The paraffin will not show up on knitted goods and the writer has used it very successfully on similar occasions.

Length of Time to Run a Traveler

Please tell us how long a No. 8 traveler should run on No. 12 yarn on practically new rings. We think our man is using too many. (2772)

No. 8 travelers running on 12s yarn should be changed every three or four weeks to give the best and most economical results. The speed is high and the traveler is so heavy that there is very little chance of their breaking and flying off as lighter ones do. After a traveler has run three weeks it has become worn so that it gives a very uneven tension on the yarn, and thus is the cause of many ends breaking; it also wears the rings excessively. Travelers are cheaper to replace than rings. If the rings are nearly new,

but have been run long enough to get "smoothed up" (some makes of rings take longer to "smooth up" than others), the travelers might be run four weeks safely before being changed, but I would not advise running any longer than this.

One mill man finds that a No. 5 traveler on a 2⅛-inch ring, with 140 revolutions front roll will run about five weeks. He says: I make it a practice to change all travelers and while at times I can let them run over a week longer, it hardly pays as we plan to change so many frames a week. I should think a No. 8 traveler is rather heavy, unless for a smaller ring. In summer, travelers do not run as well as in the winter.

Paste for Worsted Drawing Rolls

I would like information as to how the green paste is made for top drawing rollers to keep the stock from sticking to them. I am having this difficulty in drawing fine wool. (2855)

I do not use anything on my drawing rolls, but apply an emulsion at the first gill box. I take 1 gallon of olive oil to 3 gallons of water, adding enough ammonia to make the oil and water mix, and also a small amount of liquid soap. This I have found to work very well on all classes of wool, the mixture of ammonia and soap making the stock run very clean.

Another mill man sends the following: The following recipe for mixing paint used on rolls will be found to give satisfaction:

3½ quarts acetic acid
3 lbs. best French glue
2 ozs. oil of origanum
2 lbs. chrome green paint

Dissolve the glue in the acid for about twenty-four hours, adding the oil and then the paint, and keep stirring the mixture. Apply the paint hot, giving the rolls three coats. If the correspondent will dampen the wool there would then be no necessity for this paint.

A third correspondent to whom this question was sent replies: I have never used any kind of paste or roller varnish

for wool drawing rollers. I know of some firms who have tried it with more or less success, but none of the varnishes seem to be durable. Glycerine rubbed on the hands and applied to the rollers will relieve the lapping trouble temporarily.

Harsh Bleached Cotton Knit Goods

Under separate cover I am sending you sample of bleached goods, which you will notice has a hard scroopy feeling. This is made from a combed cotton and bleached in lime, after a caustic soda boil. Can you tell me what causes this peculiar feel, and how to remedy it, so as to bring the cloth out soft and springy? (3007)

A bleacher gives the following information: The harsh, scroopy feel of this sample is due to the caustic boil. The cause is from the alkali being too strong, shrinking up the fiber and giving it the harsh feel of which the mill complains. This can be overcome in several ways. I presume, however, your inquirer will desire to get a good full feel, with the least possible handling. If he has any of these goods on hand he can soften them down and get a full feel by giving them a soap bath. Get a good quality soap and use about 20 pounds of it to 50 gallons of water, with about 2 quarts of glycerine or glycerine substitute. Pass the goods through a solution of this and mangle them out, letting them lie for about four hours; then dry up for further processing.

To overcome the trouble in the first instance, cut down the quantity of alkali or caustic soda; use a solution of one-half caustic soda and one-half soda ash in the boiling process. It will then soon be found out what is the cause of the trouble. If the inquirer desires the goods to come out softer still let him obtain a good quality bleaching soap, not a resin soap, and use it in his boiling process. I will caution him here, it is better to use just the caustic and soda ash alone, than to start to use soap or compounds, for the simple reason that some compounds for bleaching will give more trouble than the one he has on his hands. That is why I advise getting a good quality bleaching soap. Some compounds give all kinds of stains out of the keir and it is hard work to trace them.

Keep the keirs well lime washed and use the caustic and soda itself first to see if any change is made in the feel of the goods. If there is not, let him try the soap addition and note any difference. If he does not get satisfaction with these

experiments, instead of using chloride of lime let him use a bath of sodium hypochlorite for the bleaching agent; he can mix this himself if he has a lime mixer, as follows:

100 pounds of chlorine or chemic powder
60 pounds of soda ash

Dissolve the soda ash in 30 gallons of boiling water, mix the chemic powder in 40 gallons of cold water. When the ash is dissolved add to the chemic liquid and agitate well in the mixer. Add water to make into about 200 gallons. When this is agitated and mixed up well, let it settle and use this instead of the chemic for the bleach. The inquirer may have to let the goods lie a little longer for the mixture to do its work but the goods will be a better white with less risk of tendering, at the same time producing a full feel to the goods that it is used on. There is also not the same risk of the goods turning yellow from the process. If he desires to obtain a good thick feel, with a soft handle, let him try out the above suggestions.

Uneven Color in Cotton Yarn

I am sending under separate cover a skein of 2-30s yarn which does not run even in color. Our dyer has the impression that it may be caused from some contact with machinery when spun. Can you suggest the cause? (3046)

The skein in question has a distinctly dark part and also a lighter colored part. There are no knots, but on raveling the darker portion of the skein one thread seems darker and yellower than the other. We do not think this was caused by contact with machinery in spinning, but may be due to using stained cotton in mixing. Roving or other bobbins are often allowed to get oily, and the layers of roving nearest the wood get discolored from this cause and spin a yellower thread than the roving from the outside of the bobbin.

Knitting Hard Yarns

Will you kindly give me some advice on running 3/20 silk on a 10 cut machine. (3097)

The boss knitter in a well known mill replies to this question as follows: I am running 3/20 silk on a 10 cut machine as follows with good results: I first see that the cap and stitch are set absolutely correct. I then run the ends through three rings which are on the stop motion rod, with

a rag wrapped around the top ring in order to take uneven strains off the ends. I also give the middle ring a little twist making the ends describe a letter V in their course. This is the most satisfactory way I have ever tried. I have tried the disc tensions, but the cloth always looked rough or wavy.

A manufacturer of long experience sends the following: No special adjustment of the machine is necessary to run 3/20 silk on a 10 cut machine. More attention is given all hard yarns, or ply yarns, in the matter of tension on the yarn when running to keep the ends straight, or in other words keeping out the kinks and to prevent the yarn running first slack and then tight. On all hard yarn or on some grades of silk I use an oiled tension on the stop motion rod between two tension discs or rings, the yarn touching or rather drawing over this oiled surface about half an inch. More or less tension can be had by turning the rings in opposite directions. It has got to be a habit of late to use a special needle in all silk frames, that is, a needle with perfect polish or finish, no rough spots, but as smooth as glass.

Winding Mercerized Yarn

We are having considerable difficulty in winding a 2/24 mercerized yarn for knitting. This yarn is kept in the basement where all our woolen and worsted yarns are kept. Should mercerized cotton yarns be stored in a dry room? (2898)

The trouble is, no doubt due to some cause other than being kept in the basement. It is the general impression that all yarns should be kept in a moist atmosphere, including yarns for knitting. It will be found that all hard twisted yarns work much more satisfactorily if kept a little damp, as this has a tendency to soften them. The inquirer does not state what the nature of the trouble is, and whether the yarn is on skeins or cones, and for this reason it is difficult to answer the question intelligently. However, it is perfectly safe to keep the yarn in the basement unless it is found to be exceptionally damp.

Shrinking Cotton Goods

We have been called upon to undertake the shrinkage of some cotton goods. We do not know of any method by which this can be done. Ordinarily, cotton cloth stretches

in process and we have never handled cloth which has not stretched. Can you advise us of any method of shrinking the cloth? Of course, we refer to shrinking in length; there is a natural shrinking in the width always. (3105)

The goods are to be wetted out with water and then hung or festooned in a drying room so that the moisture will evaporate. The point to attend to is not to allow the drying to proceed at such a rate that the threads in the cloth will not adjust themselves to the new condition of tension. This is the whole problem in shrinking cottons. The goods are woven under tension in the loom, which gives to the pieces a length that is not natural. When the pieces are dampened, the twist of the warps begins to readjust itself to this tension, and, in consequence, a shrinking occurs.

No doubt if cotton cloth in the moist state is dried on a continuous tenter frame, and heated so as to drive off the water held mechanically, there will be a permanent set given to the fabric, corresponding to the shrinkage, and which, if the job has been done in a proper manner, will prevent the goods from further shrinking. The whole problem is simply one of wetting the goods and subsequent drying under normal evaporating conditions.

A finisher of wide experience replies as follows: If the inquirer undertakes to shrink cotton cloth in the length he will undertake the impossible. In my many years' experience I have finished cotton piece goods in what is called a "shrunk finish," but I have had a gain in length. The goods have been accepted and repeat orders booked for the same finish, so it seems as though the results must have been satisfactory.

There are only two methods which I have used in obtaining a shrunk finish. The first method is to pass the goods over a tenter machine with as much tension as the cloth will stand, at the same time stretching them as wide as possible, the idea being to take as much twist out of the goods as possible; then mangling them through a starch solution to give the necessary feel, and passing them over the dryers without any tension either way. The cloth should be allowed to shrink back naturally to its own texture. I have passed them in this manner as often as three times before the shrinkage ceased; then we knew that we could not get any further shrinkage.

For example, we have cut out small lengths, say one yard, or one and one-half yards, after finishing, and then submitted them to a washing test. We have found a little shrinkage in

the length, but none in the width. In this way the inquirer will be able to tell whether he has a good shrunk finish, as what is required is that when the cloth is cut up and washed or gets wet it will not shrink any further.

In the second method of obtaining a shrunk finish, the goods are bleached, scutched, mangled, dried, wet out, dried, then starched to obtain the desired feel, then passed over the dryers again. In all these operations it is absolutely necessary to use as little tension as possible so as to allow the cloth to shrink naturally. There is always a pull on the yarns which makes the cloth shrink in the width, as the inquirer explains. For him to shrink it in length is impossible. The idea of the shrunk finish is to finish the goods while allowing them to shrink all they will until there is no further shrinkage.

Rough and Uneven Carding

I am boss carder for a mill in Canada with 5 sets of 48-inch cards. We run on an average 3 run yarns and use wool that is not scoured. The shrinkage, if scoured by hand, is about 30 per cent. We use 50 per cent. of such wool and 50 per cent. of our own card waste made from this greasy wool, and are troubled with rough yarn and coarse and fine ends. After cleaning the cards they are run for a few hours fairly well, then the card clothing glazes over and the work is rough and uneven. We have to use hand combs to clean the breakers as hand cards will not do the work. Can you tell me where the trouble is and is it possible to get 250 pounds per set per day of roving from such stock and have it smooth and even? If not, what should be the production? We have no wool washing machine or wool duster here. (2785)

The inquirer fails to state whether this stock has been colored or not. If the stock has been colored in the grease there would be a way to overcome this difficulty. In the dye kettle when preparing stock for coloring use a little alkali to start the grease and rinse off with water. If the stock is run in its natural state, that is, from the fleece, it will surely gum up the cards. If there is no way to arrange for a scouring apparatus at the plant, I would suggest getting an open set 28 press point fancy. This will keep the cylinder on the cards clean and the yarn will not be so ragged or rough. I think 250 to 300 pounds a day on a 48-inch card is a very good production. However, I think it would be a good plan to try this fancy as I have no doubt that it will be of great assistance.

Gas Fumes from Hydrochloric Acid

One of my customers who operates a shoddy mill is troubled by gas fumes from the hydrochloric acid and has no salvage from the chemical elements used. I would appreciate any information you can give me regarding this. (2788)

From my understanding of the above inquiry, I do not quite see how any "salvage" of spent hydrochloric acid gas can be expected. Owing to the low initial cost of this acid, whether used directly or produced by decomposing common salt with oil of vitriol, the cost of recovering the amount that is driven off from the chambers will be too great to warrant the outlay.

If there is an excess of hydrochloric acid to such an extent as to be the cause of trouble or a nuisance to the neighborhood, there is a probability that this plant is improperly designed and constructed. A well proportioned plant should give off but a minimum of hydrochloric acid after its work has been accomplished in the baking oven.

Meaning of Gauge on Full Fashion Hosiery

What is the meaning of 33 gauge, 36 gauge, 39 gauge, etc., as applied to full fashioned machinery and hosiery? We find no simple definite rule covering this and would ask your opinion as to whether the following covers the question completely: The gauge when referring to the hosiery means the number of wales or ribs in one inch. For instance, a 39 gauge hosiery has 39 wales or ribs in one inch of the fabric. The gauge when referring to the machine means one-half the number of needles in 3 inches. For instance, a 39 gauge machine would have 26 needles to the inch. In other words, a 39 gauge hosiery is knit on a machine having two-thirds of 39, or 26 needles per inch; a 42 gauge hosiery is knit on a machine having two-thirds of 42, or 28 needles to the inch. (2866)

Your definition of the term 33, 36 and 39 gauge is correct as far as the application of the term to the knitting machine is concerned. When you apply the term to the resulting product, it is not always so easy to determine, as the 39 gauge hose does not mean a hose that has 39 wales or ribs in one inch, but on the contrary it means hose made on a 39 gauge machine, therefore, on a machine having 26 needles to the inch.

Inasmuch as by reason of the elasticity of the fabric the

hosiery shrinks after being knitted, the actual number of wales or ribs per inch is usually more than there are during the course of knitting on the frame, but not by any means always of the same proportion as 3 to 2. To determine the gauge of the machine that a certain piece of hose is made on requires practice and judgment, and it cannot be done simply by counting the ribs. One thing is certain, that your conclusion that the 39 and 36 gauge hosiery has 39 or 36 ribs to the inch is incorrect. The term gauge, if applied to the hosiery, always refers back to the machine on which it is made.

Finishing and Scrooping Hosiery

In finishing cotton and silk hosiery in a washer of 100 gallons capacity, in which we use 3½ lbs. of soap and 2 lbs. of acid for a 50 lb. lot of goods, would it be necessary to use three and one-half times as much soap and acid, if we were going to finish the same 50 lb. lot of goods in a 350 pound vat? If not to that proportion, please state just how you would determine the amount of soap and acid, according to the amount of water contents. How much water is necessary to finish a 50 lb. lot of cotton and silk goods? Does the revolution of the washer determine the scroop of silk? By that I mean, does the acid bath exhaust quicker when the revolutions are greater on the washer?

(2789)

It is customary to make calculations of the necessary amount of scrooping agents required on the basis of the number of gallons of scrooping solution necessary to properly manipulate a given quantity of goods. If the inquirer finds that 56/100 ounces of soap and 32/100 ounces of acid per gallon gives the desired scroop, then this same proportion must be maintained, regardless of the fact that it is proposed to use a vat larger than necessary for the amount of goods stated, namely, 50 pounds. One and one-half gallons of solution per pound of goods to be treated is the minimum amount that may be used. There is no advantage whatever in increased speed of the washer, it being merely necessary to manipulate the goods sufficiently to insure an even penetration.

Weaving Tender Warp

What remedy can I apply to a No. 8 poorly twisted cotton warp to make it weave? It wears off between the harness and reed. Would sizing be of any value? How much sizing would be required for a four cut warp? What materials are

used in making the solution and the time required for the process? (2779)

I would suggest that the warp in question be resized. This can easily be done if the warp does not contain a very large number of ends. If, however, the warp cannot be resized, I would suggest hanging the harnesses as loosely as possible, making the shed just large enough for the passage of the shuttle. This will ease the chafing of the yarn, both in the harness and in the reed. A wax roll placed immediately between the warp, behind the back lease rod will also help quite a little, as the yarn will receive quite a coating of wax in passing over the roll. I might add, that if the cloth is to be bleached, wax cannot be used. If this does not remedy the difficulty then a coarser reed must be used. If a reed is used calling for 3 ends in a dent, then have the warp reeded into a reed that will sustain the width, but put 4 ends in a dent. These are the methods I have usually followed in handling soft sized warps, and have always been able to weave them out.

Iron Stains from Kiers

I have been having a lot of trouble with iron stains from our kiers. I have given the kiers a good coat of Portland cement several times, but it does not seem to stick to the iron. Will you kindly suggest something to use for a good coating that will stick to iron. (2824)

First give the kiers a thorough cleaning and when drying white wash the inside with lime and water. I have handled a great many kiers and never found this remedy to fail.

A bleacher writes as follows: The trouble this inquirer is having will occur very frequently if he does not look after his kiers. I would advise him to clean out the kiers thoroughly at the bottom, lifting up the grate bars and cleaning underneath. If there is any scale, chip it off and then mix up a solution of lime wash of good consistency, about one pound of lime to a gallon of water. Slack the lime first with a little water and allow it time to swell. Then stir in the water until the lime wash is a little thicker than cream. Then give the inside of the kier a thorough coating of this lime wash. If one coat does not leave it white, give it two coats. If the inquirer is using a caustic or soda ash boil he should give the kiers a good lime wash about twice a week. About

every three months the bottom of the kier should be taken up and cleaned thoroughly underneath. If the stains still occur, the trouble must be due to the boiler. See that this is thoroughly free from scale as there is often trouble caused by allowing the boilers to get too dirty. I would not advise using Portland cement either in the kiers or in the ageing vats. I have never found anything to beat the old lime wash for preventing kier stains.

Another bleacher replies: The trouble complained of in inquiry 2824 is due to the fact that the Portland cement was not applied in the right manner. We use nothing else in our mill and have very good results in bleaching. We make up a very thin mixture of cement and apply it to the kier with a flat paint brush, allowing it to cool gradually at the normal temperature, and it slowly hardens to a stone-like surface. After it dries and is hard we smooth it by rubbing sandpaper over the surface. Our kiers are coated only when the plant is about to close down or about once a year. Many so-called iron stains are due to improper boiling or channeling, caused by poor circulation and bad packing of the kiers.

Speck Dyeing Fancy Worsteds

Please send information on speck dyeing of worsted cloth containing white and colored silk effects, which will leave the silk clear. (2831)

I have found it a good plan to make up a stock solution for one barrel, fifty gallons, as follows for the speck dyeing of worsted cloth containing white and colored silk effects:

50 lbs. hard logwood extract
44 lbs. soda ash
16 lbs. bluestone.

The logwood is first dissolved in a small amount of water, after which the bluestone is added and dissolved. Then cool by adding a little water and add the soda ash in small amounts so that the liquor will not foam. Bring slowly to a boil and boil for four hours, then add the necessary amount of cold water to fill the barrel.

In speck dyeing with the above stock solution for one to eight pieces of cloth, make a solution of one barrel, using about three pailfuls of the stock solution and the balance water, testing 2½° Tw. This solution is fed into the kettle,

the cloth running under pressure with the rolls down. Then add two pailfuls of soap. Run the cloth in this bath thirty minutes; then rinse with warm water for twenty minutes and with cold water for ten minutes more, using the overflow. The silk is left clear.

Builder Gear for Woolen Mule

Is there a rule for finding the builder gear required on a woolen mule for the following change or for like changes? I am running 3½ run warp, using a 60 builder gear picking two teeth. What gear do I require and how many teeth each draw for ⅝ run filling? (2798)

The builder gear must be changed according to the proportionate increase, or decrease, in the diameter of the yarn, and not according to the proportionate increase or decrease in the size or run of yarn. A 2 run yarn, although double the weight of a 4 run yarn, will not have a diameter twice as great as the 4 run thread.

To illustrate, a one-inch square will have an area of one square inch; a two-inch square will have an area of four square inches. Thus, increasing the size of the square produces an increase in the area equivalent to $(\text{Side})^2$. This law holds true also in regard to the areas of circles. Suppose a six-inch water pipe is substituted for a three-inch water pipe; the capacity of the six-inch is not in proportion to the increase in diameter, but in proportion to the increase in area, or

$$\frac{(6'')^2}{(3'')} = 4 \text{ times capacity.}$$

A yarn is analogous to a cylinder and the area of a section cut at right angles to the axis of the yarn will vary in proportion to the square of diameters, and the diameter of yarn will vary in proportion to square root of areas. The ratio of the diameters of two counts will be found to vary inversely as the square root of counts vary.

For example: Take 4 run and 1 run.

Square root of 4 = 2
Square root of 1 = 1

Square roots of run vary as 2 to 1.
Diameters of run vary as 1 to 2

or what is known as inverse proportion.

A builder on woolen mule, or any mule for that matter, must change the position of rail for each draw, to accommodate the thickness of each layer of yarn on bobbin or cop. This is dependent upon the size or diameter of yarn.

If areas of circles vary as the squares of the diameter, then diameters vary as the square roots of areas vary.

Applying this rule to yarns we find that the diameters of yarns vary inversely as the square root of the counts or run. Suppose we are changing a mule from 4 run to 2¼ run. Builder gear is 60 and picks two teeth per draw. We must decrease size of gear in the same ratio that the diameter of yarn is increased.

First Formula:

$$\frac{\sqrt{\text{New Run} \times \text{Present Gear}}}{\sqrt{\text{Old Run}}} = \text{New Gear}$$

Second Formula:

$$\frac{\text{New Run} \times (\text{Gear})^2}{\text{Old Run}} = (\text{New Gear})^2$$

$$\sqrt{\left[\frac{\text{New Run} \times (\text{Gear})^2}{\text{Old Run}}\right]} = \text{New Gear}$$

Substituting values we have—

First Formula:

$$\frac{\sqrt{2.25 \times 60}}{\sqrt{4}} = \frac{1.5 \times 60}{2} = 45 \text{ Gear.}$$

Second Formula:

$$\sqrt{\left(\frac{2.25 \times 60^2}{4}\right)} = \sqrt{\left(\frac{2.25 \times 3600}{4}\right)} = \sqrt{2025} = 45 \text{ Gear}$$

This gear, however, must pick the same number of teeth as the 60 gear picked. If we desire to increase the number of teeth picked we must increase the gear in proportion.

Applying this rule to data in query, using second formula:

$$\sqrt{\left(\frac{625 \text{ Run} \times 60^2}{3.5 \text{ Run}}\right)} = \text{New Gear}$$

$$\frac{.625 \times 3600}{3.5} = \sqrt{643} = 25.3 \text{ Gear}$$

This gives a 25 gear to pick two teeth. A 25 gear picking 2 teeth is equal to a 50 gear picking 4 teeth, or the 60 gear picking 4.8 or 5 teeth.

$$\frac{60 \times 2}{25} = 4.8$$

Where the gear is not changed and we only desire to know the number of teeth required to pick, per draw, on builder gear, then a new formula is required.

$$\sqrt{\left[\frac{\text{Old Run} \times (\text{Present Pick})^2}{\text{New Run}}\right]} = \text{New Pick}$$

In query the change is from warp to filling, but no mention is made regarding the size of bobbin. If the weight per doff is not changed then the formula will give correct results.

When the weight per doff is changed it will be necessary to take the gear calculated by formula and change it in proportion to the increase or decrease in weight of doff; that is, more weight, a larger gear, less weight, a smaller gear, picking the same number of teeth.

If we are changing the number of teeth picked per draw then the result calculated by formula must be changed in inverse proportion to change in weight per doff; that is more weight, less teeth to pick; less weight, more teeth to pick.

Amount of Wool Scoured Abroad

We are desirous of learning if possible the amount of wool scoured by the following countries: Japan, Australia, Argentine, Uruguay, Italy, Spain, France, Canada and Russia. (2848)

To the best of our knowledge, there are no complete figures later than 1898 covering the amount of wool scoured by various countries. These figures were published in the "Dictionary of Statistics" by M. G. Mulhall; George Rutledge & Sons, London, Eng., publishers. The last copy was published in 1898, and since then no one publication has compiled this data.

We can obtain incomplete information for most of the countries mentioned, but in no case does it answer the inquiry. We know in a general way that Australia scours about 25 per cent. of its total wool clip. The Australian clip for the season of 1915-16 was 569,775,000 pounds. There have been radical changes in the wool consumption of Italy, Japan

and France, and in that of the other countries you mention, since the European war started, and we have seen no complete figures for the years 1915-16. It is barely possible that such information can be obtained from U. S. Consular Reports, and for these we would advise you to address the Bureau of Commerce and Labor, Department of Commerce, Washington, D. C.

While Australia scours a considerable part of its wool clip, there is very little scouring done in the Argentine and Uraguay.

In a general way, it may be stated that the amount of woolen and worsted machinery in a country is a good guide to the amount of wool scoured, for there are very few countries that import wool already scoured. Russia is a possible exception, its purchases of scoured wool in England being quite large. Some countries like Japan import large quantities of tops, or combed wool, and of course this has been previously scoured.

Equipment for Carbonizing

What equipment is necessary for the carbonizing of card waste, etc., to produce 1,000 pounds per day carbonized stock?

The sulphuric acid method does not require much equipment. Two round tubs of the ordinary dye type, and any good carbonizing dryer will produce a thousand pounds of stock per day very easily. The sulphuric acid bath should stand at from 4° to 6° Tw., depending upon the foreign matter present in the stock. Let stand for 3 hours, extract and bake, when the vegetable matter will be thoroughly carbonized.

Direct Black on Silk Hosiery

We are getting a very poor black on our ladies' tussah silk hosiery. Can you tell us how to dye the goods with a direct black whereby we can obtain a good shade? (2791)

Beyond doubt, the best and most satisfactory black is that produced from logwood. Unfortunately, however, there are few dyers who know how to operate the process. The silk, in skeins, should be thoroughly clean and immersed in a bath of basic sulphate of iron at 52° Tw. for several hours, then washed, and immersed in a 25 per cent. cutch bath containing a little fustic, keeping the temperature about 165° F. for three hours. Wash and dye in a bath containing the

equivalent of 60 per cent. to 75 per cent. of logwood chips and soap. Dyeing progresses slowly for 2 or 3 hours. A bluer shade is secured by subjecting the iron mordanted silk to immersion in an alum bath standing at 6° Tw., and then following with the succeeding operations as described. A fine, deep black of superiority is obtained by iron mordanting as above, then "blue dyeing" with yellow prussiate of potash (or soda) and hydrochloric acid, then pass through the alum bath, and finally dye with logwood and fustic.

Dyeing tussah silk with direct colors is not a most satisfactory method, especially for hosiery, but if the diazotisable blacks are employed good results will be assured. The process, as applied with Diaminogene B, for example, requires from 6 to 8 per cent. of dye, and about 3 per cent. sulphuric acid. Enter the skeins at 100° F., and gradually raise the temperature to the boil in about ¾ hour. After dyeing and rinsing, enter the silk in a fresh, cold bath containing

2— 4 per cent. nitrate of soda
9—12 per cent. muriatic acid, 1.16 specific gravity.

Work for 20 minutes, lift, rinse and pass through a fresh warm bath containing about 0.7 to 1 per cent. phenylene diamine, dissolved, boiling in a small quantity of soda ash. This developer produces a most satisfactory shade, and if the preliminary dyeing was properly done, a depth of tone and a degree of fastness meeting all requirements are obtained. Ordinary direct blacks on tussah silk do not yield shades of any startling degree of fastness.

Equipment for Bleaching Linen Towels

On account of embargoes we find that we must do our own bleaching instead of being dependent upon converters. We now have 36 looms and desire to increase to 108 looms and want to know the approximate cost of equipment for bleaching in a 108-loom plant and what the equipment should consist of. What converting machines, with prices, are necessary to spool, beam and cone the yarns. We buy natural warps, 1000 to 1200 ends, also natural skeins, 54 inches, and natural 40/3 reversed skeins which are to be bleached and coned for sewing purposes. (2764)

One hundred and eight looms on towels weighing about 4¾ pounds to the dozen and finished about 20 inches by 40 inches will use about 2,300 pounds of yarn daily, and will need the following equipment for bleaching and handling:

1 sewing machine
1 roller wetting-down machine
1 kier to hold about 1 1-3 tons
1 washing machine
1 squeezer
2 pumps for lime and sour
1 bluing machine
1 scutcher
1 hot air drying machine
6 bleaching bins, reels and sundries
Warping machinery for yarn from chain warps
2 beaming machines
1 slasher
Filling preparation machinery, 240 spindles

This equipment would cost in the neighborhood of $12,000. No account is taken in the above of cost of power equipment and buildings.

Setting a Worsted Card

How would you set a 2-cylinder, 4 licker-in card for ⅜ blood and ½ blood? What gauge would be used to set lickers-in and feed rolls? Also would you start to come closer between first top divider and licker-in and keep coming closer until you come to the first cylinder? Would you set all the workers on the first cylinder with the same gauge, also how about the workers on the second cylinder? What is the standard weight of 5 yards of sliver from the card for ⅜ blood? ½ blood? What is a fair production for a 60 x 60 inch, 2-cylinder, 4 licker-in card for ⅜ blood? for ½ blood? Would you run ½ blood wool after ⅜ blood on the same card without resetting the workers and get good results (good sliver free from pea lumps or neps)? I would also like to know some particulars about setting a card for high ¼ blood and low ¼ blood wool. Would it be better not to have so much preparing on a card for high and low ¼ blood wools, say to have 2 lickers-in instead of 4 lickers-in, or does the preparing (lickers-in) make much difference? (2812)

Set the first feed roll to the licker-in to 22 gauge, second feed roll to 28 gauge to the licker-in and have the points of the same set in to the bottom one about one-sixteenth of an inch. Set the clearer to 30 gauge to the licker-in as well as to the feed roller. Set the licker-in to 22 gauge; dividers to 24 gauge; workers on first cylinders 26 gauge; strippers, 24 gauge; doffer, 26 gauge; strippers, 26 gauge; workers, 28

gauge; doffer, 28 gauge; comb, 28 gauge. Set fancy so that the point of the wire will rub against the cylinder wire, but do not set it in too deep. For ½ blood the feed rolls can be set the same as for ⅜ blood; licker-in 24 gauge; dividers, 26 gauge; strippers, 26 gauge; workers, 28 gauge; doffer, 28 gauge; strippers, 28 gauge; workers, 30 gauge; doffer, 30 gauge; comb, 28 gauge.

I have always found it well to set off some for ⅜ blood and set in closer for ½ blood, which is apt to roll some and cause neps in the card sliver, making it harder for the comb and giving more noil.

For ¼ blood wool I would set the card about 2 points less than for ⅜ blood, as the ¼ blood is longer and coarser and pretty hard on the wire. The standard for the weight cannot be given as this all depends on the carding. If the cards are in good condition they can be fed heavier and the resulting sliver will be heavier, while if they are in poor condition, the sliver will be lighter.

A fair production for a 60 by 60 card, run at 90 revolutions per minute, on ⅜ blood is from five to six hundred pounds for ten hours, and on ½ blood from three to four hundred pounds. For coarse wools it is not necessary to have as many carding points, but they can be carded on the four lickers-in just the same.

Dyeing Sulphur Black on Piece Goods

Is it practical to dye sulphur black on piece goods in a 4-compartment machine in one run. If so, is there any danger of the color oxidizing on the nip rolls and frequently peeling off after a certain thickness accumulates and depositing itself on the cloth? (2728).

It is quite practical to dye cotton piece goods in a four-compartment dyeing machine, provided the dyebath is sufficiently strong and the travel right for the weight of goods to be dyed. As to danger due to oxidization, and the subsequent "peeling off" of color, this condition should not occur where the dyeing temperature and the proportion of sodium sulphide to the amount of dyestuff is correct.

The dye machinery need not consist of four dyeing compartments, since two are sufficient for almost any class of cotton goods, but it is desirable to have as part of the machine one or two washing compartments, besides a space, an empty compartment will do, for oxidizing before the dyed

and nipped cloth passes into the wash. Some machines are so built that this arrangement forms part of the first wash compartment. An ideal arrangement is to have the two dye compartments each provided with nips made of iron, and either or both wrapped with cloth, or to have the upper roll of rubber while the lower one is of iron, but covered with cloth. Before each set of nips there should be placed spreaders to protect the cloth and prevent folding.

Iron dye compartments, with all accessories and fittings also of iron are, beyond question, the most satisfactory that can be had, but vats made of wood are very common and last a long time. No brass, copper or bronze fittings should be used. Good dyeings can be made with sulphur blacks upon goods of medium weight as a standard, by regulating the rate of travel so that the speed is between 16 to 22 yards per minute, or about 11,000 to 13,000 yards per day of 10 hours. That this rate should be effective, the duration of the immersion of any point of the goods ought to be from 3 to 4 minutes.

The dye recipe for this work can be based upon the following quantities of materials: Starting bath: For each 50 gallons of dye liquor:

10- 12½ lbs. concentrated sulphur black.
10- 12½ lbs. sodium sulphide crystals.
1¼- 2½ lbs. soda ash.
½- 1 lb. soluble oil.
10- 12½ lbs. common salt.

For large continuous machines, which are not unusual, holding 500 gallons and over in each compartment, a corresponding proportion must be used. During the dyeing of the goods the bath is replenished by adding, according to the weight of the cloth, the following quantities, based upon a percentage of the weight:

5½-6½ per cent. conc. sulphur black.
5½-6½ per cent. sodium sulphide crys.
½ per cent. soda ash.
½ per cent. soluble oil.
1- 2 per cent. common salt.

Dye the goods with only one passage and finish with a good wash, and in the last rinse water add a small amount of acetate of soda.

Difficulty in Fulling Knit Cloth

We enclose a sample of knitted cloth, which after fulling seems to separate, as you will notice, the wool from the cotton. It is about 65 per cent. wool and 35 per cent. cotton. Could you advise us where the fault lies, in the spinning of the yarn or in the fulling process? We full it simply with soap and water. The wool we use is partly alpaca noils and partly white wool noils. The cotton used is partly Peruvian and a very little Oxford strip. The alpaca noils are dyed black. (2800)

I infer that the sample of knitted cloth was fulled in a regular fulling mill. It also has the appearance of having had pretty harsh treatment, and that the alpaca noils were the major part of the mixture of the wool percentage. The alpaca noils being smooth and silky will not hold as well as wool, and I would suggest that either a higher percentage of wool be used, or a rotary machine of the laundry type be used for fulling. It is my opinion that better results would be had by making the yarn by the core process.

Dressing for Rim and Spindle Banding

Can you give me a formula for dressing such as is sometimes used on rim and spindle banding for mules? (2832)

I have found the following formula useful for dressing for rope and spindle banding for mules:

1 gal. black molasses.
2 lbs. beeswax.
2 lbs. lampblack.

Cut wax into small pieces, boil and stir until the ingredients are thoroughly dissolved and mixed. Apply warm.

A superintendent writes: I have found the following formula for dressing rope and spindle banding for mules to give good results: Mix with 1 pound of black lead an equal proportion of powdered rosin and Albany grease. This paste should be applied to the band at least three times a week, until thoroughly saturated.

Sulphur Black on Cotton Yarn

Please give me the process and formula used for dyeing cotton yarn with sulphur black. Is it necessary to boil out the cotton yarn before dyeing? (2799)

It is not necessary to boil out the cotton yarn either for warp or filling as even and satisfactory results are obtained without this treatment. The yarn should be stripped and extracted and dried as soon as possible after dyeing. Glauber's salt is used to start the first bath and to twaddle with when needed, in very small amounts. If the bath is too weak more sulphide of soda and dyestuff should be added. For a standing bath the following formulæ may be used:

30 per cent. sulphide of soda, crystals.
7½ per cent. sulphur black, 25 per cent. paste.
2 per cent. alkali.

Boil for one hour. The yarn should then be lifted and entered into the wash water as quickly as possible. For the first wash warm water, that is, with the chill off, is used and the yarn run for ten minutes; the second wash should be cold and the yarn run for another ten minutes.

Finishing Uniform Cloth

Will you outline the processes in finishing a dark blue, 18-ounce uniform cloth? (2834)

Uniform cloth finished by the writer is reeded 72 inches in the loom to finish 56 inches wide, with a finished weight of 18½ ounces per yard. When eight pieces are burled and mended in the usual careful manner they are run into the fulling mills, four pieces in each mill, two pieces on each side. Having marked off one yard on each piece so as to check up the shrinkage, they are shrunk about 10 per cent. in length which means a snug four inches on the yard, allowing an extra 4/10 inch for stretch in the following processes.

The finisher must use his own judgment as to the body of soap required and regulate it by the length of time he wishes the goods to full. The soap the writer uses is a 12 ounce soap, that is, 12 ounces to each gallon of water. This brings the goods up to 57½ inches wide in from four to four and one-half hours. If the goods chafe or waste any in the mills I reduce the body of soap, as this is a sure indication that the cloth is coming up to width and making felt too slowly and wearing out in the mills; that is, of course, assuming that the mill attendant is not running them too dry. The goods are now opened out and run over a perch with a man on each side looking through the cloth so

that any holes or other damage made by the fulling mills may be discovered at once and attended to.

After putting the pieces into the cloth washer and raising a lather with the soap which fulled the goods, this lather is washed out with warm water and a fresh soap applied. They are then given a good scouring, using as much warm water as possible, being careful to remove all the soap from the cloth, so that there will be nothing to cause a resist to the dye when the pieces are in the dye kettle. To be absolutely sure of this, the goods may be given an alkali bath. After the last soap in washer has rinsed thirty minutes, I drain the goods nearly dry and add a barrel of solution made up of 15 pounds ammoniated potash, running this into the washer with a pail as evenly as possible and letting the goods run for twenty minutes. If there is any soap left in the goods it will appear in the form of a white foam. After again rinsing in warm water until satisfied that the alkali is all rinsed out, which takes a very short time, the cold water is turned on for twenty minutes. The goods are then taken from the washer, opened up and folded, after which they are ready to be colored.

Our goods are generally colored a medium to dark blue. After dyeing the pieces are speck dyed in the cloth washer, using a speck dye that gives color enough to the burs and other specks. After being extracted and dried the goods are carefully back burled and then given two runs on the back on a double cylinder shear. The face is then sheared, running the number end last and giving enough runs so that the face is almost clean of all loose fiber. The goods are then reversed and given two to three runs, number end first, which leaves the face absolutely clear of loose fiber.

The goods are then dry steamed and given a good hard pressing, number end first. They are given a little steam from the back sponger as the cloth leaves the hot cylinder, and run on wooden rolls, then set aside to cool; after which the same process is repeated with number end last. When cool after this second pressing they are given a final examination and wound up for shipment.

Trouble in Scouring Wool

I am sending you sample of Montivideo crossbred wool. We have bought a quantity of this wool and are having trouble with it. In the scouring we do not seem to be able to get a clean wool and I would be glad to know whether

it is the fault of the wool or our method of scouring. We use a one bowl machine, the solution consisting of

30 lbs. pure fig soap
30 lbs. textile soda

which we put into a barrel full of water. We dissolve the soap and soda in the bowl, putting in 6 pailfuls of this mixture and running the wool through once. Then we add two more pailfuls of this soap and soda and run through again. This time we do not change the water in the bowl. After running the wool through this time we run off the water and refill the bowl, running the wool through the clean water, this last being the third time the wool is run through.

We now take the wool, after running through the dryer, direct to the card, and here is where our trouble begins. The cards grind the wool all to pieces, delivering it to the card balls in chunks so that when it gets to the comb it throws off a noil of 25 per cent. Do you think it necessary to run the wool through an opener? Or should it be mixed with domestic fleece wool? (2926).

On examining the samples of wool in the grease I can see no reason why there should be any difficulty in scouring it thoroughly clean under proper scouring conditions. It is a good open quality wool and should not require a very strong scouring liquor. Care should be exercised in scouring, however, for if too lightly scoured there will be a tendency to gum the cards. The sample of scoured wool does not appear to contain over 10 or 12 per cent. natural grease, which should not cause any trouble in carding, as it is practicable to leave a small percentage of the natural grease in the wool.

If the liquor is too strong and the temperature too high, the wool is liable to be stringy and matted, which will cause trouble in carding out. The latter seems to be the fault in question, as the scoured stock is stringy and badly matted in places. It has the appearance of having been scoured in too strong a solution at too high a temperature, with excessive agitation of the wool during scouring.

This class of wool is naturally heavily charged with carbonate of potash, which in itself is almost sufficient to scour the wool clean. With water at a proper temperature it is not necessary to use a very strong scouring liquor. This is especially true where soda, soap or carbonate of soda is used.

I would suggest that the amount of soda used be reduced at least a third in quantity, say, 30 pounds of soap and 20 pounds of soda, using about 5 pailfuls of the solutions in

the first bowl at a temperature not over 125° F. For the second bowl, run about two-thirds of the dirty solution off and fill up the bowl with clean water. Add 2 pailfuls of fresh liquor and rinse in clean lukewarm water. Care should be taken not to handle or agitate the wool any more than is necessary during scouring to prevent rolling or felting of the stock.

Judging from the quality of the wool it does not seem necessary to run it through an opener or to mix it with domestic fleece wool, if properly scoured and carded. It might be well to set the cards closer, speed up the fancy and let it work lighter on the cylinder.

A good solution for scouring fine and medium wools is made up as follows:

50 pounds potash soap,
55 pounds pearl ash,
100 gallons water.

Boil until thoroughly dissolved and mixed. Use about 6 or 8 pailfuls of this solution, increasing or reducing the amount according to the size of bowl.

I washed a piece of the greasy wool sent me in one bath of very light scouring soap, rinsed once in warm water and it appeared perfectly clean and bright.

Cost Problem in Underwear Mill

The mill expense for producing 3,736 dozen vests and 6,092 dozen suits is $3,235.18. How much is mill expense per dozen for each vest and suit? Please give solution.
(2810

The above data is insufficient for the solution of the problem, as all expenses must be figured in proportion to the direct labor. Undoubtedly this was more on the suits than on the vests, therefore, the inquirer should advise what the productive labor cost amounts to on each article. This productive or direct labor cost, of course, includes not only knitting, but also cutting, sewing, finishing, examining and boxing.

If the mill pays a piece rate for all above operations, the information can be given off-hand, but if a daily wage is paid, determine the average daily production of an operator and divide the daily wage by the daily production, and the result will give the piece rate.

Determining Yarn Number and Twist

Kindly advise us as to the proper way to determine the number of cotton yarns? Also how to get the cable on various cotton cords. I am called upon frequently to give this information on samples sent to us from manufacturers, and as we have no equipment for the above work I would appreciate any information you may give me. (3110)

The number of cotton yarn is usually determined by weighing a known length of yarn on grain scales and then calculating the number from the weight and length. Tables are available which show the weight of a given length for each count or size of yarn and save the time required for calculations. A good publication of this character is Simplex Yarn Tables. This book and Whitworth's "Practical Cotton Calculations" would be of assistance. They may be obtained from TEXTILE WORLD JOURNAL Book Department at the New York office. Yarn numbers may also be determined by calculating balances that are on the market.

With regard to how to get the cable on various cotton cords, this question is susceptible of two interpretations. Assuming that you mean how is the cable effect obtained on cotton cords would say, that usually a number of ply threads are doubled together and a final twist is inserted in the direction opposite to that of the first doubling twist. If your question refers to how the twist in the cable cord is determined, the answer is that this can be easily found by untwisting the yarn in a twist counter, which can be supplied by supply houses or dealers in testing instruments.

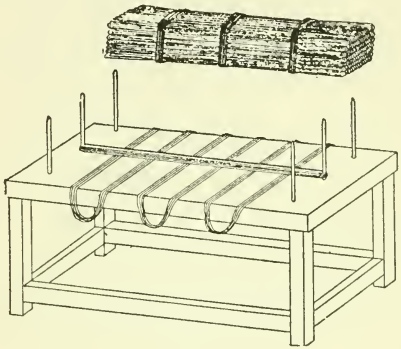
Yarn Bundling Machine

We would like to make a machine for putting up skeins of yarn in bundles. Can you advise us how this should be done? (2827)

I have made my own bundling machines at various times, both for shipping yarns and for bundling white yarn previous to dyeing. All that is necessary is to secure a piece of hard wood, 16 x 34 x 2 inches, and sandpaper and shellac it. Then drill holes as required. Legs are then fastened on the plank, making it into a sort of table with braces between the legs and a footrail to hold the table down when lifting the bundle. Steel pins, 16 inches long with the shoulders 5 inches from the bottom and a screw thread extending from the lower end to the shoulder, are made with the thumb

screw to hold the pins securely, the thumb screw being below the top of the table.

The illustration shows the machine complete with several skeins land on it to form the beginning of the bundle. A finished bundle is also shown, which is 3 hanks wide, 4 hanks deep, making 12 hanks in a bundle with three ties. The first operation is to lay 3 hanks across the table inside the pins. Then take two skeins and loop over the middle pin at one end of the table; turn once or twice and loop the other end over the corresponding pin at the other end



of the table. Repeat this for the side pins, and build up the bundle until it is the size and weight wanted. Then take the first cross band and pull one end through the other, drawing up tight. Slip the long end, which is through the loop, under the band, and pull up the other two cross bands in the same way. The bundle is taken off the table by putting the hands under each end and lifting off. I found it better to use yarn bands in place of string, as the latter often cuts the yarns.

Brushing Sweaters

What type of machine is best adapted to get the brushed effect on worsted sweaters? We have had communications from various napping and brushing machine companies, but would prefer the opinion of practical men in this line.
(2854)

It is a difficult matter to advise the kind of machine to use in this case, not knowing the nature of the cloth or the kind

of nap wanted. A good deal of so-called worsted carries a percentage of cotton which calls for different handling. Any of the standard machines will do good work if the proper kind of clothing is used and adjustments are made in running the cloth.

I would suggest that the inquirer send a piece of cloth, say three or four yards, to several machine builders and have them brush the goods. He can then pick the machine he wants. I have found this to work out very satisfactorily when in need of new machines.

Oil for Spinning Shoddy Yarns

We would like to know what is the best quality of oil to use in the spinning of shoddy yarns for sweater making. Would you recommend oleic acid or paraffine oil? Would oleic acid mix with water if soda ash is added?

(2804)

I would recommend oleic acid to be used in spinning sweater yarn. Oleic acid will mix readily with water if soda ash or borax is added, and it is easily removed after it has been used for lubricating in spinning. It is important that the oleic acid be free from substances which saponify with difficulty, especially mineral oils and stearin.

Another mill man states that in handling shoddy stock that has been scoured, it is not advisable to use a very heavy oil, as this is liable to cause the cards to gum or glaze over; a very light emulsion should be used. Continuing, he says: lard oil is one of the best lubricants used in oiling shoddies and medium stock. It is also frequently used in connection with a cheaper oil. When the emulsion is thoroughly mixed, it serves the purpose satisfactorily, at a reasonable cost. Olein acid is a product derived from the manufacture of stearin candles which, in turn, are manufactured from animal fat. Naturally it is a good lubricant for coarse stock when free from acid and other impurities. It is used in varying proportions according to the nature of the stock in hand, a good proportion being 4 parts of oil to 6 parts of water. In making the emulsion use borax or ammonia. The water and borax should be brought to a boiling point before adding the oil. After adding the oil boil a few minutes, when the emulsion should present a smooth, milky appearance, free from oil bubbles on the surface. Use from 20 to 25 per cent. of the weight of the wool. On dark colors it may be necessary to

use less water and more oil in making the emulsion. This is a matter of judgment which should be left to those in charge of the stock preparation.

Soda ash should serve as a mixer when the water and soda ash are brought to a boiling point before adding the oil, but borax is preferable. Paraffin oil being a mineral substance, it is easier emulsified when mixed with lard oil or other oils of good saponifiable qualities. When used in the form of a well-mixed emulsion, it is less liable to gum up the cards, and is easier removed from the yarn in scouring.

Another correspondent replies as follows: It is rather difficult to state just what is the best oil for this work, as there are so many different makes of oil for wool and shoddy stock. I have always used a saponified oil which mixes readily with water without adding anything to it. I have also used a Nos. 1 and 2 lard oil mixed with water, adding a little ammonia or soda to make it mix, and obtained good results. I find this even better than the saponified oil for carding and spinning, except that the yarn is more oily and requires a better scouring. Judging the stock before oiling is very essential as some wools and shoddy require more oil or emulsion than others. Some wool shoddy is very oily while another lot is dry and this must be considered when batching. For wool and cotton mixes I find it best to oil the wool only, and not the cotton.

Coloring Sewing Machine Oil

We would like to color our sewing machine oil. It requires that the color will show upon white cotton fabric wherever the oil touches and that this color will wash out easily. Can you give us this information? (2823)

What are known as "bases" of certain of the coal tar dyes might answer for this purpose. These "bases" are not dyes, but are colors in an intermediate stage of dye manufacture. As a rule, they are readily soluble in oleic acid, which mixes in all proportions with mineral oils. The suggestion is to procure some of the bases of such dyes as methylene blue, methyl violet, or even of nigrosine, and dissolve it in oleic acid by means of gentle heat, and add this in various proportions to some of the oil to be colored, then making tests to ascertain by actual trials just which base is the one that will stain the cotton the least on the wash test. No one can say before making such tests what base is the one best suited for the purpose, since some of them are liable to stain

over-bleached cotton, while it is likely that none of them will appreciably stain unbleached cotton.

Test for Chromium in Woolens and Worsteds

Please inform us the chemical test for chromium in woolen and worsted cloths. (2777)

To make a test for chromium in textiles is not difficult, but the test cannot be satisfactorily made unless the operator is supplied with the proper reagent and apparatus with which to perform the work. The apparatus consists of a simple retort stand provided with a ring upon which to place a triangle of wire which serves as a support for a small porcelain crucible, in which the test is made. There should also be provided a Bunsen burner of the common laboratory type, and the necessary gas tubing.

The reagent consists of a mixture of about equal parts of dry carbonate of soda and nitrate of soda. This mixture can be made up by any local druggist. It should be preserved in a small glass stoppered bottle, or, when many tests are likely to be made, it may be kept in a small (one ounce) wide mouth bottle, closed with a cork, through which is inserted a short piece of quill glass tubing, that will permit a small quantity of the reagent being shaken out at will.

The test is made by cutting a small piece of the cloth, about half an inch square, and then rolling it between the fingers until it forms a small ball the size of a pill. This pill is then placed in the crucible, and slowly heated to redness, when the cloth chars and in a short time is converted into ash. All organic matter should be completely burned off. Remove the flame from under the crucible for a moment, and then place a few grains of the reagent as much on the ash as possible, and again apply the heat until the mass is seen to be in quiet fusion. This only requires a minute. Now remove the flame and allow the crucible to become cold, and note whether the fused mass shows a green coloration. If it does it is a sure indication that chromium is present on the cloth. With reasonble care in applying the heat of the flame to the crucible, the latter may serve for many tests, but if the heat is applied too rapidly and with too great force, the crucibles will crack and become useless. In many laboratories the larger fragments of broken porcelain crucibles are made use of for this test.

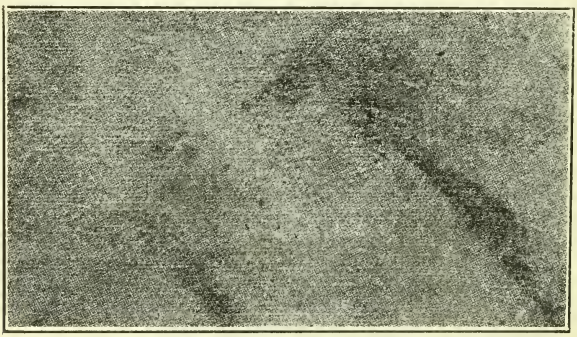
Production of Garnett

What is the production of a garnett machine, 30 x 60, on woolen shoddy? Will a garnett 30-inch cylinder produce more than a 20-inch cylinder, and what is the production of a 20 x 60 garnett? (2857)

There is little difference in the production of a 30-inch diameter machine and a 20-inch diameter machine, the chief difference being that the larger size has more carding points, and will open the stock more thoroughly. The production of these machines on woolen shoddies varies entirely with the class of rags being used—that is, how fine the threads are and how hard they have been twisted. On this account there is a great variation, and would range from 25 to 50 pounds per hour for 60-inch wide machine.

Pink Spots on Bleached Goods

I have read with interest the reply to question 2789 regarding pink spots on bleached knit goods, and have no doubt but that the following information will be of value: The cause of bleached goods turning pink after being bleached is due to letting them remain too long in the wet state after bleaching



CLOTH STAINED BY REMAINING IN BINS TOO LONG

and before drying. These stains will always be found on cloth at the bottom of the bins or boxes which has remained there too long in contact with the wooden sills or boards; especially is this true where there is not good drainage and proper circulation of air underneath the flooring of the bin.

These stains are more frequent in summer than in winter.

A yellow brown stain and mildew stains are also apt to appear from the same cause. The remedy is to pull out the goods every day and to dry if possible within twenty-four hours after bleaching. I am enclosing a sample of fabric showing pink stains, which was cut from a piece which came from the bottom of a lot that remained too long in bins without drying.

Logwood Black on Loose Cotton

What is the most economical formula for dyeing a good logwood black on loose cotton? (2883)

In dyeing blacks upon cotton, it will be found best to make use of hematine as the source of the color. Hematine is a much better product than ordinary logwood extract, on account of the better degree of oxidation.

For 100 pounds of raw cotton prepare the bath at the boil with

25 lbs. logwood extract, or its equivalent of hematine
2 to 2½ lbs. fustic
6½ lbs. bluestone

When all is dissolved, enter the cotton, pole well for 1½ hours at the boil and let stand over night. In the morning lift out and drain and allow to remain in a heap for 48 hours. Then work for two hours in a cold bath prepared with

14 to 16 lbs. clean copperas
4 lbs chalk

Let remain in heaps over night, and in the morning wash well and dry. A black so produced will stand milling.

Nicked Rollers in Worsted Spinning

I have been having trouble for some time with nicked rollers. An overseer spinning the same yarn had his ratch at 8½ inch and was not troubled with bad rollers. My ratch was 8 9-16 inches and I had from 10 to 15 spoiled bobbins a doff. (2912)

Among the causes that contribute toward nicked rollers may be mentioned: (1) the roving twist, (2) lack of pressure on covered rolls, (3) front iron rolls on which the fluting has become worn smooth, (4) front carriers too close to the

front rollers, (5) short ratch, (6) accumulations of dirt on covered rolls. The inquirer should first make sure that the roving he is spinning comes from the same roving frames as that which his fellow worker is using. If it comes from other roving frames it may have a harder twist. There is also the possibility that he is using an older lot, which has become more set. Then let him see to the pressure on the top rolls, making sure that there is sufficient pressure there, also make sure that the front and back carriers are not too close to the front rolls. Look over the front rolls and see that they are in good condition as regards the fluting and general condition of their surfaces. Lastly be sure that the front pressure rolls are kept clean and well oiled. Perhaps some of these suggestions will give the solution of his difficulty.

Possibly, if the inquirer will carefully examine the traverse motion, he will find the cause of nicked rollers. There may be a dwell of a few seconds on the turn. A heart cam with an adjustable pulley at each side is a very good traverse motion and is easy and accurate if properly understood; the heart should always be pressing against one of the pulleys. The instant the point of the heart leaves the pulley on one side the heel should strike the opposite pulley.

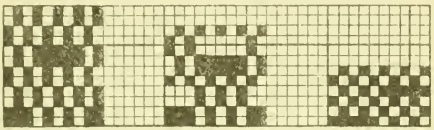
Weaving Huck Towels

We are running a number of looms on dobby towels with single huck and are often asked to make the double huck, but as our dobbies are single cylinders with one pick to bar and have to be reversed every 25 bars to get in the border, we find it very difficult to get this huck without a break where the dobby chain reverses. I am enclosing samples to explain. I cannot reverse the weave marked No. 1; No. 2 weave to give huck on both sides, I cannot work; No. 3 weave is simple. (2922)

The design shown at No. 3 is easily woven on the dobby described without trouble by reversing on the sixth pick, counting from the top of the design. To weave No. 1, the best way to do is use filling which has been wound double on the quill and again reverse the chain on the sixth pick. The effect wanted cannot be got by using filling wound single on the type of dobby mentioned. Single ply fillings will always show three picks in the float in the cloth, and this defect cannot be overcome except by using double filling, or by using

a different kind of dobby on which it is not necessary to reverse.

Double filling will also make it possible to weave the goods twice as fast, as only half the picks, compared with single filling, will need to be put into the cloth while the goods are being woven and the goods will be just as satisfactory. When winding the double filling a little twist should be put into the



No. 1. No. 2. No. 3.

yarn. Double filling means that it is necessary to have machinery for the purpose of making it, and I have first run it on to warper bobbins and then transferred to the quill. The extra process involved will be more than offset by the extra weaving speed.

The design marked No. 2 should also, on the reversing type of dobby, be made with double filling or it will show the same defect in the float as No. 1. Picks numbered 1 and 6, counting from the top of the design, would of course, if double filling were used, have two threads to a shed instead of one.

Dye Tubs on Galleries

We are planning a new dye and starch room. We have an idea of putting all dye tubs, etc., on galleries above the machines so as to simplify piping and save floor space. Before committing ourselves to this scheme, we would like to get information as to whether it has been tried and what the experience of other manufacturers has been with the same. (2919)

The idea of placing the dye tubs on galleries is good, and where space is valuable it should be adopted. Wherever it is possible to work with solution descending by gravity it should be done. Of course, in the present instance it is not possible to give this inquirer any very extensive information as to the desirability of the scheme in his particular dyehouse, since he furnishes no plans or any data regarding the extent of his plant.

The placing of dye tubs on galleries is common in Euro-

pean mills, for the reason that space there is more valuable than it is here, but the idea is gradually extending even here to utilize as much of the space between the floor and the roof or ceiling as possible for many operations than can be well elevated over the floor. When dye tubs are placed overhead, the one point to be given very careful consideration is the drainage, and also to so protect the machines on the lower floor that splashing will do a minimum of injury.

An overseer replies as follows: The idea described by the inquirer is a good one. I have worked in plants having the equipment arranged in this way, and have also worked in a bleaching and finishing plant that had a range of six starch tubs on a gallery or platform, with drains underneath, and set up high enough to allow another tub on a low wheeled truck to be pushed underneath. The dye plants I have worked in with this arrangement did jig dyeing, and the tubs were placed above the level of the jigs, with a drain running the entire length of the dyehouse, the tubs being made with two outlet valves, one in the bottom of the tub over the drain to facilitate the washing out of the tubs, and the other being over the jig to allow the dye liquor to be run into the jigs. The water and steam connections were simplified, the whole combination working to perfection. One drain only was required for all the dye tubs. At the same time it raised the steam nearer the ceiling and gave the fans a better chance to do their work and keep the dyehouse clear. If the inquirer will go into details carefully, I am sure he will find such an arrangement to his advantage, saving money in materials and fittings, as well as labor in handling the dyes and starches.

Shrinkage in Bleaching Cotton Linters

What is the cost of bleaching cotton linters and what shrinkage in weight is there during bleaching? (2886)

The cost of bleaching cotton linters averages about 3c. a pound. The shrinkage or loss of weight in the bleaching of linters depends a great deal upon the quality used. Last season, and during the latter part of the previous season, the oil mills cut their linters a great deal closer, with the consequent result that the shrinkage was materially increased, for in so closely cutting them a great deal more dusty fiber is made, and in many instances a broken seed is added. Taking this into consideration, I would say that in a general way

the average shrinkage would be between 18 and 20 per cent. on the better qualities, and from that upward, according to the inferior condition of the linters. It would not be surprising at some times to see the shrinkage run up to 30 per cent., or perhaps more when inferior stock is used.

Making Cotton Yarn Absorbent

What is the cheapest way to treat cotton yarn so that when perfectly dry it will readily absorb water? (2937)

The inquirer probably has in mind the treatment of cotton yarn so that it shall have properties the same as or similar to absorbent cotton. That cotton in any form shall possess water-absorbing qualities requires that it must be completely freed from all the natural fatty and waxy constituents that normally belong to it. These can only be removed by chemical treatment, the most effective of which consists in giving the cotton a kier boil for 8 to 12 hours with a solution containing 1 per cent of caustic soda under low pressure, then washing, and afterwards bleaching with a chloride of lime solution containing about 1 per cent of available chlorine, the bleaching action being permitted to proceed to the limit, but if possible just short of producing any oxy-cellulose.

After bleaching, wash well, and sour with a 1 per cent solution of muriatic acid, then wash and neutralize with a ¼ per cent solution of caustic soda, and finally rinse well to remove any possible trace of alkali remaining in the yarn. Bisulphite of soda is much used as an antichlor to prevent chlorine odors remaining in the cotton, but some manufacturers make use of a very weak soap solution which seems to answer the purpose, besides leaving the cotton in a soft condition.

Of course, other processes for treating cotton are to be made use of. When absorbent properties only are desired at the lowest cost, all other considerations being neglected, the process to adopt is as follows: For each 100 pounds of cotton yarn, boil the yarn for 2 hours in a solution containing 2½ pounds of soluble oil made from castor oil, and to the bath add 1 pound of pearl ash. After the boil drain off, and wash well in clean, soft water and dry. Cotton so treated will be found to have practically all the properties of a bleached absorbent cotton, but, of course, it will not meet all the tests, nor will it have the same fine white appearance that is characteristic of the bleached article.

Ridding Woolen Rags of Silk

Will you kindly give me a good method for ridding woolen rags of silk? (2882)

Considerable difficulty is experienced in using woolen rags that contain silk as an impurity, and from all the data that we have been able to collect on the subject there is no practical method that will effect the removal of the silk from the wool. The chemical reactions of silk and wool are so nearly alike that the use of reagents is not likely to cause the destruction of one of the fibers without acting somewhat injuriously upon the other. There are a number of textile mills ready to take hold of any practical process for separating wool from silk, much in the same way that cotton and other vegetable fibers are removed from wool, as in the case of shoddy, but up to the present no process is available.

Since a solution of basic zinc chloride dissolves silk and is known not to seriously attack wool, even when boiled, there is some prospect that this reagent may be used to advantage. Basic zinc chloride is made by dissolving 10 pounds of ordinary zinc chloride in 1 gallon of water and adding ½ pound oxide of zinc, and heating until the latter is completely dissolved or nearly so. In using this solution no exact details can be given, but it would be well to make several trials with varying quantities, stopping at that point when the silk dissolves completely and at the lowest temperature.

Sizing for Cotton Thread

We want formulæ or information regarding the glazing or sizing of cotton thread. As you know, cotton threads to be polished are run through a solution consisting of starch and oils and then run over dresser brushes. Exact formulæ for the sizing and general information about the process is what we are after. (2880)

Formulæ for sizing cotton thread.

Gray thread—16 gals. water at 170° F., 9 lbs. starch, 1 lb. yellow wax.

Black thread—15 gals water, 7 ozs. white soap, 16 ozs. hard paraffin.

Boil until well dissolved, and then add 9 pounds Indian cornstarch, which has previously been made into a thin pulp. Boil together until well mixed, then cool and use.

White thread—17 gals. of water at 175° F., ¾ lb. oil soap,

cut into small slices and stirred until properly dissolved—add 7 lbs. starch mixed with cold water.

Pour into the boiler the liquid starch, then add 12 ozs. paraffin wax, 8 ozs. white wax, 5 ozs. castor oil.

The mixture should not be used until quite cold.

I have also found the following formulæ to give good results:

White sewing cotton—16 gals. water 175° F., 7 ozs. pale white soap, sliced and properly dissolved, 6 lbs. starch, mixed with cold water. Pour into the boiler the liquid starch, and add 6 ozs. white wax, 5 lbs. yellow wax, 2 ozs. spermacetic.

The mixture should not be used until thoroughly dissolved and allowed to cool.

The above are suitable for two or three-ply single throw sewings or for 6-fold cabled.

Sizing Cotton Skeins

We are enclosing a sample skein of yarn which is weaving poorly. This yarn is sized with starch and tallow, using 14 ounces of starch and 6 ounces of tallow for about 700 pounds of yarn. We first add the starch to the water and heat it to the boiling point, then add the tallow. When thoroughly mixed, we soak the yarn in this solution and then put it into an extractor and from there the skeins are put onto sticks and thoroughly dried. It is then ready for spooling and weaving. We are also enclosing a sample of the tape in which this yarn is used. (2870)

I would suggest the inquirer try using cocoanut or olive oil, which are both soluble, in the solution, making up the same as before, but simply bringing the sizing solution to the boiling point, and I think the results will be more satisfactory.

Silk Hosiery Manufacture

What kind and grade of silk are generally used by the average American manufacturer in knitting silk hosiery? What denier raw silk do they generally buy? To what form of thrown silk do they generally make them into, i. e., how many ends do they double together on the doubler; how many twists per inch do they generally put into it? Do they generally knit their hosiery with silk in the raw or with soft silk? (2887)

The great bulk of the silk used by the American manufacturers of silk hosiery and other knit goods is of Japanese

stock of best No. 1 grade, or of strict No. 1 (New York classification).

They usually think that they are getting Summer reeled silk and Kansai stock. The Summer reeled silks, be it observed, are usually distinctly superior to the Spring reelings, and Kansai silk is of a harder and nervier character than the Sinshiu; most of the Sinshiu silks being of a softer and less nervy touch.

Whatever the purchasers may think they are getting, it is a fair statement that they have delivered to them a great deal of Sinshiu, and a great deal of Spring reeled silk, for of both the supply is always large. These Japan silks will generally lose 18½ per cent. of gum in the boil-off.

The size of the silk employed is generally 13/15 denier, probably averaging, for silks of this class, about 14 1/5 deniers. The number of ends doubled together depends entirely upon the fabric which it is intended to make, but usually it is from 8 ends upward, 12 and 16 ends doubled together being quite common. These are "thrown," or twisted together, the combined thread being then described as "tram."

The twist given is usually quite slack, 1½ to 2 turns per inch, and it would seldom be above 3 turns per inch. When the goods are knitted the thrown silk in the gum is generally used, the gum being boiled out from the garments after they are made, and afterwards the goods are dyed.

Wool for Blending

I am enclosing two samples of stock. Please examine the fibers carefully and advise me if they will blend well and are of the proper length. Will the stock spin good yarn?
(2913)

I am of the opinion that the sample of white stock will cause some trouble because the fibers are longer than those of the red stock. There are some small nibs in the colored stock which might not open, but this will not cause very much trouble as there are so few of them. To card mixtures it is necessary to have the stock uniform in length and free from nibs. There is an old saying, "What I cannot open between my four fingers, I certainly cannot open in the card." The inquiry does not state what size yarn is to be spun from the samples of stock. The stock should be carded out well and the yarn should not be spun too fine. I would suggest that a sample of 50 pounds be made up and tried out first. It

depends a great deal on the treatment the stock receives in the carding and spinning departments, whether the yarn will prove satisfactory.

Dilution of Starch Mixing

We find in starching bleached goods that the consistency of our starch is constantly thinned down by the addition of water which is carried into the starch box by the goods. As a result of this we frequently have to run off more or less starch from the starch box in order to keep the finish uniform. We would like to know if it is feasible to keep this starch which is run off and work it over again. (2923)

The inquirer asks a question that has for a long time perplexed me. I have the same trouble, and have often thought it poor practice to waste starch in this manner. I have overcome the difficulty in respect to obtaining a uniform finish without running off the starch simply by drying up the goods; but here the question arises, does it pay to pass the goods over the dryers before starching? In some instances I have found it does, in other cases I have found that the cost of starch run off in this manner does not exceed the cost of drying up the goods; therefore I run off the starch.

In my opinion it is not feasible to try to use this starch over again, as it is next to impossible to determine the amount of water squeezed out of the goods and diluting the starch, which makes it impossible to obtain a uniform finish. With some customers it is imperative that the goods be dried up before starching. This also applies to some of the different kinds of finishes, and I would advise the inquirer to work out for himself this problem, as I have done more than once; to find out the amount of starch used in this manner, the cost of same, also the cost of passing the goods over the dryers an extra time, because it is a question of cost. If it pays to finish a certain way, there is no further problem to it, and the inquirer should proceed in the manner that will give the largest production at the smallest cost. This is my method of working, and it is the best advice I can give the inquirer.

Power for Wool Machinery

Kindly inform me what horse power motor would be required to drive two looms, 7 feet, 6 inches long, and seven looms, 10 feet, 6 inches long; 1 set of cards, 1 spinning machine of 240 spindles; 1 warper, 1 washer; 1 wringer;

2 fulling machines, 1 dryer, 1 twister, 1 picker, 1 rag machine, 1 raising machine. (2905)

It is, of course, difficult to give any close approximation because of the lack of all-important specifications as to the make of machinery. We should judge, however, that the average load would not be more than 60 hp., and if motor drive is used a 75-hp. motor should handle the work. It must be acknowledged, however, that this estimate might not be within 25 per cent. either way.

Formula for Cementing Cloth or Felt to Iron

Please recommend a formula to make glue for fastening flannel on spinning rolls. Is the so-called Misenheimer formula a trade secret, or are you in a position to publish it? (2941)

I do not know anything about the Misenheimer formula nor do I know of any trademarked cement that is claimed to be used expressly or particularly for cementing the cushion to a top roll. There are as many formulas for this purpose as there are roll coverers, each roll coverer suiting his own fancy regarding the proportions and manner of preparing, but the ingredients are always the same and consist of resins, gums and oils mixed with glues, acids and water.

A good formula for cementing cloth or felt to iron is as follows: Put resin into an iron or copper pot. Pour turpentine into it until the resin is saturated, and the surface of the oil is up to within half an inch of the top of the resin. This must be heated carefully as the turpentine is very inflammable. It can be done on a steam or hot water heater, or in a fireless cooker. It should not be done indoors except on a dirt floor, and in a fireproof shed and should never be done on a gas flame or on a coal or wood fire.

A good way is to have an iron brick or bench weight heated to a dull red heat, and put this on some ashes spread on the ground; put the kettle on top of the hot iron and then, having the pot well covered to keep ashes from resin; bank ashes all around the iron and the pot.

To get the same specific gravity of pitch at each mixing, the iron should be about the same degree of heat, and the resin should be cooked for about the same length of time at each mixing. About three hours will do. For the same reason it is better to prepare the pitch than to buy it. To one part of pitch, add from four to five parts of glue, heat until

mixed and allow to cool in an old, but clean tin can. When cool the cement will be hard and the tin can may be cut from it. When ready for use, warm the cement in a glue heater, thinning it to consistency with vinegar.

The most reliable glue for this purpose is pulverized, granulated or ground glue. At this writing it is almost impossible to procure this glue, and all glues have increased in price nearly four hundred per cent. over what the price was a few years ago. Flaked or chipped glue may be used as can many of the solidified glues.

When covering rolls that are to be heavily weighted or that are to be subjected to hard wear or to abuse, or where the tendency of the cloth is to loosen from the rolls, the rolls should be washed in a solution of hot water and potash or sal soda, then dried and painted with a paint suitable for painting iron. When the paint is dry the cloth may be cemented to the painted surface. The writer came into possession of this formula through the courtesy of a New Bedford roll coverer of thirty-five years' experience.

Pin Beater and Rigid Blade Beater

What are the advantages of a pin beater over a blade beater on dyed, undyed and bleached stock, assuming all to be strict middling cotton? (2910)

The carding beater or pin beater has the advantage in each case on account of combining the carding and beating action, the pins penetrating the tufts of cotton, thoroughly separating and dividing them. Therefore the cotton is deposited on the cages in a finer and more even sheet and the working of the card lessened slightly. It also removes more dirt and leaf than the rigid beater. Usually the finisher packer is equipped with the pin beater. The matter of beating cotton requires study, because every time the beater pounds the cotton some of the fibers are broken and destroyed. To remedy this defect, among other good features the Gordon licker-in attachment on cards will enable the beaters to run slower and also with one less process of picking, making just as clean and better and stronger yarn than by beating the cotton harshly in the pickers.

Carbonizing and Stripping Rags

I would like to know the best process of carbonizing rags such as shoddy mills handle; also the best process for strip-

ping old shades from rags, so that it would be possible to obtain light shades, such as light tans, light greens, grays, etc. (2936)

We have sent the inquirer a copy of an address made by Dr. Louis J. Matos before the American Institute of Chemical Engineers, which covers part of the above inquiry.

Regarding the stripping of rags, the following process is very commonly employed: Boil for ½ to ¾ of an hour in a bath made up with from 3 per cent. to 6 per cent. of bichromate of potash (or bichromate of soda), 6 per cent. to 12 per cent. oil of vitriol, and 3 per cent. to 6 per cent. of oxalic acid. Keep the material well turning, if it is in a deep vat, otherwise ordinary poling will suffice. Rinse well. Some dyed rags will strip fairly well by treating them for about ½ hour in a bath with 5 per cent. to 10 per cent. of soda, then rinse thoroughly and dye.

Carding Hair

I am enclosing a sample of hair which we are using. We are experiencing great difficulty in carding this material. Our trouble is that we cannot get the hair to the cylinder. We use a Bramwell feed with a 60 inch single worsted card. The feed rollers deliver the stock, but the burr roller does not seem to grab the hair, consequently, instead of the hair being taken away by the burr rollers, the hair winds around the top third roller of the feed rolls and chokes the burr roller, causing the stoppage of the card. I would like some information as to what is the cause of this trouble and the remedy. What would be a good solution to scour this grade of hair? We would also like to have a formula which would be best suited for washing this grade of hair. (2948)

It seems to me that the difficulty in this case is due to the burr rollers not being set close enough to the feed rolls, causing the hair to wind around the rolls. To take the stock away properly these rolls should be absolutely true and set as close to the feed rolls as possible to run them and avoid striking the points when carding stock of this nature. In turn the burr rolls should be set in like manner to the leader-in so that the stock will be delivered evenly to the main cylinder. The points may be gone on the clothing of the burr cylinder and the leader-in, which would cause the trouble in question. The points should be kept smooth and sharp and the clothing should not be too fine to properly handle hair which is of a slippery nature.

Regarding a formula for washing this grade of hair, the strength of the scouring liquor to be used should be determined largely by the amount of dirt contained in the hair. A good formula for scouring very dirty stock is made up as follows: Fifty pounds potash, 65 lbs. pearl ash, boiled with 100 gallons, of water until thoroughly mixed. Use about fourteen pailfuls, more or less, according to the size of the bowl.

One bath in a solution of carbonate of soda should render this stock clean after which rinse in clean, warm water. It would be advantageous to add a small amount of ammonia to the carbonate of soda bath.

Treating Yarn to Prevent Crocking

Kindly give us a formula for treating worsted yarn to prevent its crocking after being dyed. (2946)

This question is very indefinite and does not give sufficient data to base an intelligent reply upon. The question as to whether worsted yarn crocks depends as much upon the condition of the yarn before dyeing as upon any other condition. If the yarn is not thoroughly clean and free from grease or soap there is always a danger of the colors rubbing.

The kind of water used in dyeing has also much to do with successful dyeing. If it is hard, that is, contains lime or magnesia, there is danger that some of the dye may combine with these impurities, forming corresponding insoluble salts which show very distinctly after the cloth is made up. It may also be that the dyes used are not suitable for the work. It should be remembered that all dyes are not universally available for every purpose, some are better suited for dyeing yarns than for producing the corresponding shades upon cloth. Broadly, it may be said that the best remedy for dyes that crock is to wash the yarn so completely that no dye remains that will stain white when rubbed with it.

Removing Odors from Wool Knit Goods

We are knitting fine worsted yarns spun on the French system. The cloth goes through a scouring process and then a peroxide bleach. After coming out of the last rinse we do not smell any oil or natural wool odors, but after the cloth has stood for 48 hours we can smell this odor. Could you advise us how to get rid of it? (2954)

I will give a few formulas that have never failed me in removing the oily odors from wool and woolen goods.

For 100 pounds of goods:

8 lbs. palm oil soap
5 lbs. soda ash
3 lbs. potash
50 gals. water

Boil until the solution is dissolved. Take four pailfuls of this solution and wash the goods for ten minutes at a temperature of 110° F. Rinse ten minutes at the same temperature and then add 2 pailfuls of the solution. Wash ten minutes at the same temperature as before, adding one pint of ammonia to the last rinse. For washing worsted goods I seldom use soap. I make an alkali solution of

50 gals. water
5 lbs. carbonate of potash
1 qt. ammonia

Boil for a few minutes. For 100 pounds of goods use three pailfuls for the first wash of ten minutes. Rinse well and wash ten minutes. I never have the temperature over 110° F. in washing or rinsing. When the goods are very oily I have used two different soaps, a palm oil and an olive oil. I have two 50-gallon tanks; one for palm oil and one for olive oil. Be sure and use a good soap, the best is none too good. Use 10 pounds palm soap, 7 pounds soda ash, 3 pounds ammoniated potash, 50 gallons water and boil until dissolved, after which use:

10 lbs. olive oil soap
10 lbs. ammoniated potash
50 gals. water

Boil until dissolved. I use four pailfuls of the palm oil soap for the first wash. Rinse well and use two pailfuls of the olive oil soap for the second wash. Never have the temperature over 110° F. All of the above are good solutions and will give excellent results.

Yarn Number and Needles Per Inch

Can you refer us to any table giving the relation of the yarn number to the needles per inch in knitting machines? (2950)

A very complete table giving this information was pub-

lished in TEXTILE WORLD JOURNAL for September 16, 1916, to which the inquirer is referred. Better still, a complete explanation of the necessary calculations accompanies the table.

Yarn Sizes, Machines and Weight of Hosiery

What weights of hosiery are made from yarns ranging from 12s to 24s cotton on 3¾-inch cylinders? (2951)

Hosiery made with the following numbers of yarn on 176 needles, 3¾-inch diameter, weigh as follows:

16s yarn	28	ozs.
15s yarn	29½	ozs.
14s yarn	31	ozs.
13s yarn	32½	ozs.
12s yarn	34	ozs.

Hosiery made with the following numbers of yarn on 200 needles, 3¾-inch diameter, weigh as follows:

24s yarn	22	ozs.
22s yarn	23½	ozs.
20s yarn	25	ozs.
19s yarn	26½	ozs.
18s yarn	28	ozs.
17s yarn	29½	ozs.
16s yarn	31	ozs.

Steeping Chloride of Lime

Kindly advise us as to the most practical method of steeping chloride of lime for making up the bleaching bath. Is there any ingredient that could be used to make the lime settle in a shorter time? Our method at present is using barrels alternating each day. The lime seems too slow in settling. The lime solution is then transferred to the vat and allowed to stand overnight. The bleaching process is finished by 8 A. M. the following morning. With this method, about what weight of goods should be bleached to each 100 lbs. of chloride of lime used? (2930)

Fig. 1 shows a thoroughly satisfactory method of dissolving chloride of lime and is a method that is used to a large extent in bleach works. The tanks, 1, 2 and 3, are best constructed of masonry work and lined with cement. In some cases tank No. 3 is dispensed with, but where it is used the lime is put in and mixed with a small quantity of water and the lumps

broken up. The mixture is then run into tank No. 1 and passes through a sieve placed in the outlet. The sieve keeps back any lumps not broken and any grit.

When tank No. 3 is not used the lime is put into tank No. 1 direct, this tank being fitted with two agitators that revolve in different directions. The lime is mixed with approximately 100 gallons of water to 100 pounds of lime. After the water is introduced into the tank the agitators should be run for five or six hours and the mixture left to settle over night. In the morning the clear liquor can be syphoned off into tank No. 2, and will then be ready for use when diluted to the proper strength. Great care should be taken to see that only clear liquor is syphoned off, for if there is any lime in

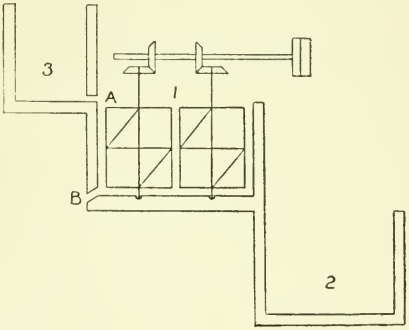


FIG. 1

the liquid it will probably cause damage to the goods being bleached.

While the method outlined above costs a certain amount to install, the results obtained are entirely satisfactory and the time taken for the lime to settle is not excessive.

It is hardly possible to give accurate figures as to the amount of goods that can be bleached per 100 pounds of lime, as various circumstances cause the amount to vary. For instance, if the goods are thoroughly boiled they will need less bleach than if not well boiled. Other factors that cause the amount of bleached goods to vary per 100 pounds of lime are the construction and weave, quality of cotton used and the degree of whiteness required.

In the illustration, A shows outlet for transferring the lime

to tank No. 1; B is an outlet from tank No. 1 for removal of the sludge.

A bleacher replies to this question as follows:

This is a question that has often been asked in the bleaching trade and has never been satisfactorily settled. The lime must be given more time to settle and the mixing apparatus equipped so that every particle of chlorine will be extracted from the lime. This is a difficulty that is experi-

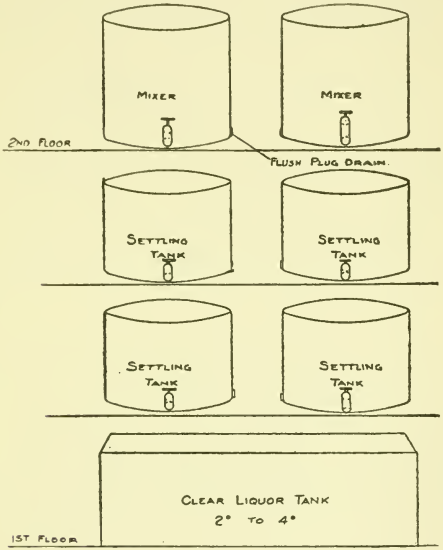


FIG. 2

enced in almost every plant that I have been in, not enough settling tanks for the chlorine and consequently the liquor has to be used before it is settled thoroughly, which is often very muddy and apt to tender the cloth in bleaching. It is then necessary to wash the sediment away, thus increasing the cost of drugs and a waste of chlorine.

The most practical way of steeping chloride of lime is to have a duplicate system with at least two settling tanks underneath the mixing tank containing the agitators, and

underneath this the tank in which the chlorine is diluted to the necessary strength.

I have never been able to ascertain the exact amount of goods that a given amount of chloride of lime would bleach, never having had the proper facilities, but I have never been able to bleach the amount of goods that chemists and scientists have stated could be bleached with a given amount of chloride of lime, hence my statements as to improper equipment. Of course, there are other difficulties to contend with besides the mixing and settling. There are proper facilities for steeping, preparation of the goods for the chemic bath, the extra or surplus water carried into the bath and other causes arising from the goods being underboiled.

Fig. 2 shows a sketch of a modern method of steeping chloride of lime. This may seem expensive at first, but it soon pays for itself. The two mixers are on the second floor, the settling tanks on stages under the other tanks, with the flush plugs all draining into the same pipe. The bottom tank is ready for use on the cloth; the water connections are all on one length of pipe, the mixing being done alternately and the sediment run up with water and agitated again and again, the dilute liquor assisting to reduce the strength of liquor in the bottom tank.

Spots and Stains on Cotton Khaki

Enclosed find swatches of khaki cloth, dyed with extrac colors. You will observe spots or stains on the cloth and any information you can give regarding the cause of them will be appreciated. The dyeing process consists of malting and dyeing on jigs, with cutch, bark, fustic, logwood, chrome, bluestone, etc. The color is carefully strained and dissolved. (2916)

One of the samples sent has a very distinct marking that strongly resembles a "water spot," that is, a spot resulting from a drop of water falling upon the dyed cloth before it was finally dry. This kind of spot is difficult to remove when it has once formed, and the only plan to adopt is to prevent, if possible, water falling upon the goods. The kind of colors used in producing the shade of this cloth (khaki) are very sensitive to mineral salts, particularly iron, and it is not possible to say whether these spots are on the goods before they enter the dye bath or occur afterward. An inspection of the pieces before they are dyed will show this point.

The common practice for goods of this weight, especially when they are to be jig dyed, is to pass the pieces several times through a malt liquor containing about 2½ ounces of malt extract per 10 gallons, and heated to 160° F., then allow to lie in the rolls over night. In the morning rinse thoroughly or, as is done in some mills, boil again with the addition of some soda ash. Wash well and proceed with the dyeing. This procedure leaves but little chance for spots to occur, and when such are noticed the cause is to be looked for elsewhere than in either the malt bath or the dye bath. As a rule, most spots are to be traced to mechanical causes, such as oil, etc., and which are extremely difficult to locate in the gray.

Broken Ends in Worsted Spinning

How can I prevent the ends from coming down on a worsted spinning frame when the machine is started up after standing over night or during the noon hour? Everything seems to be in good order, the caps are clean, the machine starts very smoothly. The roll which has been giving trouble has been refluted in the machine shop, and it has occurred to me that the breakage is caused by poor work in refluting, causing the ends to break after the machine stands for several hours. (3049)

If all the other conditions are the same as before the rollers were refluted, and if the fault has only developed since they came back from the machine shop, the cause of the trouble is easily explained. Either the flutes have been cut too deep, leaving the edges rather rough, or the spinner has overlooked the fact that newly fluted rollers require very little pressure upon the springs to get the amount of grip required for a good draw. Refluting not only makes the grip keener, requiring less pressure, but also saves power. A wad of cloth inclosed in a piece of fine emery cloth, pressed between roller and back of the topboard, will soon clear off all the rough edges.

Winding Artificial Silk

Is there any method by which we can make 150 artificial silk wind without snarling? We understand that there is an oil spray that will do this. Do you know of that process, and if not, is there any other method by which the snarling can be overcome? (2932)

In general practice it has been found necessary to lubricate

the artificial silk previous to winding as a means of overcoming the tendency to snarl. There have been several spraying devices designed to spray oil on the yarn while being wound that have found favor in some mills. In a number of knitting mills the same result is accomplished by immersing the skeins in vessels containing standard mixtures of oil, which generally are a combination of lard, olive and mineral oils, the superflous oil being extracted by the ordinary hydro-extractor. Special oils are offered for this specific purpose by leading dealers.

The superintendent of a winding plant replies: If the artificial silk is in the skein it is very difficult to wind, this process generally costing from 20c. to 25c. per pound. The proper way is to wind it from the skein very slowly on to tapered bobbins or spools, giving it a good steady scutching before winding. I would advise the inquirer to buy the silk yarn from the manufacturers on the cone and then wind it back from the cone on to spools suitable for the machine using it.

Another correspondent writes: I have had very little trouble in winding artificial silk on a skein winder provided with a trough to hold the softener. I run the yarn over a short piece of rib laid over the cylinder in the trough, each end of the rib being immersed in the softener. This puts enough softener on the silk to prevent snarling and also assists in the knitting. The silk should be knit within three days after winding.

Inspection of Knit Underwear

We are interested in systems for the inspection of our lines of underwear and wish you would outline the practice common in representative mills. (2952)

The methods of inspection depend largely upon the quality of the underwear made. Mills making the highest grades enforce a rigid inspection and in some cases the work is directly in charge of the mill manager. Naturally, cheap garments do not allow the same care and attention given to higher priced lines and the methods are very simple. The inquirer will find a discussion of this question in the technical section of our Aug. 19, 1916, issue.

Equipment for Coarse Wool Hosiery

We manufacture knit coats and knit caps and now contemplate installing machinery to make a coarse wool hose for the lumber trade, also a lighter weight. Would you give us an idea of the machines required, with the probable investment to start in a small way? (2980)

I presume by coarse goods the inquirer means about 64 or 72 needles on 4 or 4¼-inch cylinder. I would suggest that he use the latest machines which should turn out an average of about 9 dozen per day of 10 hours. By a lighter weight I suppose he means 84 or 108 needles. These will average about 7 dozen per day. A looping machine for each 25 to 30 dozen knitting capacity would be required; a 6 point looper for 72 needles and 7 or 9 point looper for 84 or 108 needles. Also a fulling mill, extractor, forms and dry box for finishing. Under present conditions it would be best for the inquirer to get information as to prices and deliveries on machinery direct from the builders, a list of whom will be found in the advertising section of TEXTILE WORLD JOURNAL.

Carding, Combing and Gilling

What makes some fallers pick up more than others; for instance, take two boxes on the same kind of work, both sets of fallers are cleaned at the same time, but one set collects more short wool than the other?

Where is the best place to put water on the sliver after it comes from the comb; between the front and calender rolls of the first finishing gill box or on the second finisher gill box?

Can you give me the proper quantity of glycerine to put on tops and the best method of applying it?

What is the best way to card and comb ¼ blood seedy wool? Is it better to work it by itself or to mix it in with other wool, or card it separately and blend it with other wool for combing? What is the best way to go about it?

What is generally done when in shearing ¼ blood wool it is found that it is cut short? Will this cause small pea balls in the top or would this short wool crimp up if the workers are not set close? Will these short ends curl up in a pea ball when the material is backwashed or when oil and emulsion are applied? Should all the short ends be taken out in the first combing or should a finer circle be used for lots like this? (2962)

The short fibers collecting on the fallers may be due to

the setting of the front and back rollers. If they cause the stock to run on the bottom of the fallers, roughing it, some of the stock will be left on the fallers; naturally short stock. This also has a bad effect on the sliver. Split or hooked pins or a draw back on the fallers will also do a lot of harm.

The best place to put water on the sliver is at the first finishing gill box, and when the stock is given a second finishing the moisture will be more evenly distributed. I never heard of glycerine being used on worsted tops. Oil is generally used and put on at the gill box after backwashing, or on the preparing gill boxes. Have an oiling box with a drum and oiling fingers attached so that the oil can be regulated to any amount desired. This oiling box can be set on the stands of the back roller and the oil will drop on the stock before it gets in to the fallers.

It is better to card and comb a seedy wool by itself and mix it at the finishing gill boxes, because if seedy wool is mixed with good wool in carding and combing, the price of the card waste and noils is lowered.

It would be better to set the card closer so that the short shearings would not have a chance to curl up and if they are once kept straight they are not apt to curl in backwashing or when treated with oil or emulsion. I would advise setting the workers on the first cylinder the same as on the second so as not to give the short wool an opportunity to curl up. In combing this lot of wool a 30 per inch big circle and 32 per inch small circle will make a suitable set.

A worsted mill superintendent replies to this question as follows: Broken pin points will often cause some fallers to pick up more wool than others, or the front roller may be lower than the fallers, causing the wool to rub on the bottom of the fallers. These are two of the chief causes of faller laps.

The best place to put water on the sliver is on the back of finishing or balling box. The following is a good formula to apply to worsted tops:

80 gallons of water.
20 gallons pure olive oil.
Enough borax to cut the oil.

In this case it would be from six to eight ounces. Boil this mixture together and stir well before using. The usual

tin trough and cylinder with fingers placed behind the back rollers of the gill box is a good way to apply this mixture.

Card and comb the stock separately, mixing after combing on the first gill box in drawing. Pea balls should not show up in any of the cases stated, if the card is suitable and set properly, that is, as close up as necessary. All short wool should be taken out in the first combing. Second combing is not general except when the stock is to be dyed.

Knitting Name on Hosiery

Is there a method or attachment for drop stitching a name or number into hosiery? (2979)

The effect can be obtained in full fashioned hosiery, although the attachment is complicated and expensive if a name is desired, but not so costly if merely to drop a few "holes" in a straight line. Where a name or number is desired the regular jacquard lace tackle would be necessary, costing at least $1,000.

Sizes for Men's Underwear

What are the most suitable sizes in 12 cut machines for making men's underwear, 34, 36, 38, 40 and 44 chest? Best kind of machines for cutting long and short sleeves? Most suitable machines for rib border, cuff ends and rib bottoms for pants and ribs for shirt ends? What are the most suitable sizes in 16 cut machines for making men's underwear, 34, 36, 38, 40 and 44 chest? What is the best method of pressing and finishing shirts and pants?

We desire a set of pattern shapes for cutting, according to the American designs for the following: Men's shirts, long and short sleeves and pants in the different sizes; boys' shirts, long and short sleeves; men's combinations, long and short sleeves; boys' combinations, long and short sleeves; ladies' underwear, vests, combinations and also union suits. (2982)

The inquirer fails to state the yarn numbers, whether cotton, wool or mercerized yarn is to be used, and under the circumstances it would not be adequate to state the size of machine. For example, with 40s cotton the sizes would be as follows:

15	16	17	18	19	20
—	—	—	—	—	—
34	36	38	40	42	44

Naturally, the heavier the yarn the more width. If a hard

yarn is used, such as a lisle or mercerized, the size of the machine would be less. A good plan would be to try a medium size and see what the result is.

As for the best kind of machines for cutting long or short sleeves, this probably means the machines that make the least amount of waste. If this is the case I would suggest a sixteen-inch with the pattern, and if too much waste is made or the sleeve is not wide enough, try another size.

There are several suitable machines for cuffs, borders and rib tails.

There are numerous good methods of pressing underwear, including hot steamed pressing and the hot mangle. There are also many styles of finishing machines used according to the class or grade of goods made.

Patterns must be made as needed. Patterns for bodies or sleeves cannot be bought. The usual way is to cut a very tough fiber board to suit. The writer desired to copy a man's garment a few days ago and used the following method: The seams were ripped up the legs, the front was unbuttoned and laid on the table over a large piece of fiber board and marked around, leaving a fair allowance for seams, etc. A garment was made up from this pattern and measured for size. If necessary the patterns could be enlarged or cut down to suit. Standard sizes for underwear seem to be unknown as every mill seems to have a standard of its own.

Rigging Up a Jacquard

Kindly suggest the best way to rig up a 600 jacquard machine to make material for 900 ends. We understand it is arranged on a process called a "double scale." (2908)

A wide variety of jacquards are made, both as regards the number of hooks and density of sley. The number of hooks does not designate the sley of a jacquard; there are heavy, medium and light sley machines. The low sley is used for heavy yarns, the medium for cottons and the fine index for silks.

We are assuming the inquirer wants to increase the sley of the jacquard. There are two ways of doing this if the ground is such that the figure is separated, and the ground is either plain or 5 end satin. This ground can be run by

a separate set of harnesses located back of the comber board and run either by a small dobby or cams, the figure to be run by the jacquard. If the pattern is, what is termed an "all-over" pattern, then the work is best left to the loom builders, for it means the introduction of three hundred more lines each repeat of the machine, and there must be at least seven repeats in the machine. This means two thousand one hundred lines, mails and lingoes to be added to a machine designed to carry a great deal less.

To do this in the correct manner the depth of the comber board will have to be increased one-half; a rather delicate job for anyone but an expert. The jacquard machine will have to be moved back so that the pull will be even on all lines. In doing this the original lines are all thrown out of line, because the comber board must not be moved, only added to. It will then be necessary to replace the original lines with new ones, a rather costly job, but often done in mills in Europe, because they are equipped to do this work. After this is completed the operator will run up against a snag in forming a proper shed on the new lines, as very few jacquards are equipped with an arrangement for tipping the griffe and the rear threads will not rise high enough. We would advise the inquirer to write to the jacquard builders.

Cotton Spinning Spindles in Europe

Can you give me the number of cotton spinning spindles in the following European countries: Great Britain, France, Russia, Italy, Belgium, Germany and Austria? I wish to have the figures for a calculation I am working on. (3048)

The cotton spinning spindles in the above countries before the war, according to statistics published in 1913, were as follows:

Great Britain	55,652,820
France	7,400,000
Russia	9,212,557
Italy	4,600,000
Belgium	1,492,258
Germany	11,186,023
Austria	4,909,458

Dye Fading by Electric Light

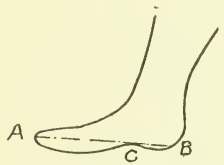
Several months ago you described the use of an electric light for testing the fading of various colored cloths. Can you tell me whether this process has been developed commercially and whether tests are now being conducted with it? (3109)

The United States Conditioning & Testing Co., New York City, has installed this equipment and is prepared to conduct tests for cloth manufacturers and purchasers. Clothing manufacturers are using the process to replace sunlight tests and many mills are understood to be testing their goods before shipment. The process is simple and equipment is readily procurable from the R. U. V. Co., 50 Broad street, New York City, or from the Atlas Electric Devices Co., 100 South Clinton street, Chicago.

Sizes of Infants' and Children's Stockings

Kindly give us information in regard to the sizes of machines required to make the legs and feet of infants' and children's stockings, and the number of needles in the different sizes. Also the length of the feet and legs of the different sizes. (3106)

The accompanying tables give details for the manufacture of various classes of stockings. Table I gives particulars for making children's hose, weighing 32 ounces on size 8. Table II gives particulars for hose weighing 26 ounces on size 8. Table III gives particulars for hose weighing 20¼ ounces on size 8. Table IV gives particulars for infants' rib leg hose weighing 9 ounces on size 5½.



The length of the leg when finished should be three times the length of the foot, plus one inch for each full size, 5, 6, 7, 8, 9 and 10; the half-sizes are the same length as the even sizes. The length of the leg when off the ribbers varies according to the quality and twist in the yarn, and must be made longer than three times the length of the foot, by about three to five inches, to allow for shrinkage in finishing.

The illustration shows one way of measuring the feet of hosiery. The measurement is taken in a straight line

from the tip of the toe at A, to the bottom of the heel at B; the line coming on the edge of the stocking at C.

TABLE I.

Sizes.	5 & 5½	6 & 6½	7 & 7½	8 & 8½	9 & 9½	10 & 10½
Dia. of ribber..	3¼	3½	3¾	4	4¼	4½
Needles.....	124	144	164	184	204	224
Dia. of footer...	2½	2¾	3	3¼	3½	3¾
Needles.....	72	82	92	102	112	122

Twenty-four gauge needles in all machines. Use 2 ends 16/1 carded cotton in leg; 2 ends 11/1 carded cotton for foot; and 20/1 in heel and toe.

TABLE II.

Sizes.	4½, 5 & 5½	6 & 6½	7 & 7½	8 & 8½	9 & 9½	10
Dia. of ribber..	3	3¼	3½	3¾	4	4¼
Needles.....	192	216	240	264	288	312
Dia. of footer...	2¼	2½	2¾	3	3¾	4
Needles.....	108	120	132	144	156	168

Needles—42 gauge dial; 36 cylinder and 42 footers. Use 34/2 combed cotton, with 60/1 for knee; 26/2 for foot, and 60/2 for heel and toe.

TABLE III.

Sizes.	4½, 5 & 5½	6 & 6½	7 & 7½	8 & 8½	9 & 9½	10 & 10½
Dia. of ribber..	3	3¼	3½	3¾	4	4¼
Needles.....	216	240	264	288	312	336
Dia. of footer...	2¼	2½	2¾	3	3¾	4
Needles.....	120	132	144	156	168	180

Needles—42 dial, 36 cylinders, 48 footers, 50 hook. Use 40/2 mercerized for leg; 30/2 mercerized for foot and 50/2 mercerized for heel and toe.

TABLE IV.

Sizes.	4 & 4½	5 & 5½	6
Dia. of ribber	3	3	3¼
Needles	176	192	216
Dia. of footer	2¼	2¼	2½
Needles	88	108	120

Use 40/2 mercerized for leg; 30/2 mercerized for foot, and 60/2 mercerized for heel and toe.

Equipment for Dyeing and Bleaching Hosiery

We would like to have you outline for us the necessary equipment to use for dyeing and bleaching, as follows: We want to dye about 300 lbs. of hosiery per day with sulphur black, and to bleach about 200 lbs. per day. It is our intention to rig up some wooden vats for this work. We would like to have you tell us the number of vats necessary for the above processes, the size of the vats to use and what the construction and piping should be. As stated above, we want to build our own dyeing apparatus and temporarily "pole" the goods. The class of goods that we are going to manufacture is made of 12s and 14s carded yarns. We would also like to have you give us a good formula for sulphur black dyeing and for bleaching. (2994)

This question divides itself into two parts: Dyeing 300

pounds of hosiery daily with sulphur black, and bleaching 200 pounds daily.

The problem of dyeing 300 pounds of hosiery daily, especially when the concern proposes to do the dyeing by the old-fashioned hand poling, is rather simple. The tubs or vats required are of the most ordinary construction, and should have about 55 to 60 cubic feet capacity, and about 3 feet deep. They may be square or rectangular, but it is preferable that they be round, so as to reduce to a minimum the possibility of goods becoming pocketed at the corners. These vats should be heated with direct steam, and have lying on the bottom a grill or lattice to serve in keeping the goods off the bottom, as well as breaking the flow of steam.

A kettle of the above size will handle comfortably 100 pounds of goods, which requires about 300 gallons of dye liquor. For such a batch there is prepared the bath as follows:

12 lbs. sulphur black
18-25 lbs. sodium sulphide crystals
6-8 lbs. soda ash
2-2½ lbs. soluble oil and
about 50 lbs. common salt.

For standing kettle, use

3½ to 5 lbs. sulphur black
7 to 10 lbs. sodium sulphide crystals
6 to 8 lbs. soda ash
8 lbs. soluble oil, and about
4 to 5 lbs. common salt.

The goods should be well wetted out before being entered into the dye bath, but for the cheaper grades this preliminary is overlooked very frequently. Keep the hosiery well under the surface of the bath, and in constant motion. Dye for ¾ to 1 hour at a simmer. Lift from the bath, allow to drain, and rinse in luke warm water, which should have a small amount of sodium sulphide added to it, together with some soda ash. Finally rinse cold, then again with luke warm water until the water runs off clear. The washing of cotton dyed with sulphur colors is as important as the dyeing itself. Afterward, brighten by means of a small amount of olive oil soap.

PROCESS FOR BLEACHING

The bleaching of such goods is best done with sodium hypochlorite, since it is cheap, and can be made without difficulty by an intelligent workman. The process is as follows:

One hundred pounds of bleaching powder of good commercial strength, which should be about 33 to 35 per cent. available chlorine by actual assay, are mixed with 50 gallons water, and 60 pounds soda ash are dissolved in 22 gallons of boiling water, and diluted with 10 to 12 gallons cold water. Add the soda solution to the paste of bleaching powder, and the mixture stirred for half an hour, and allowed to settle over night. In the morning the clear solution is drawn off and the residue of white mud washed several times with water, and allowed to settle each time, combining all the washings, and finally diluting with water to 180 gallons, which should stand at about 6° to 7° Tw. For use, this stock solution is diluted still more with water and used at ½° Tw. or at whatever strength is found best for the grade of goods being bleached.

The bleach vats may be of wood, and about the size mentioned above for dyeing. Of course, it is always best to introduce the most approved equipment for the work, but as a makeshift arrangement, the ordinary style of vat will suffice. The wet goods introduced into the bleach liquor, and allowed to remain immersed until a sample taken shows that the degree of bleaching has progressed enough, when the goods are lifted, allowed to drain, rinsed with water, and finally given a light sour with dilute acid, and afterward washed with water until the washings run off free from traces of acid. It should be remembered that no amount of recipes as published will take the place of either a dyer or bleacher, and that it will be found most economical to employ a skilled workman who knows just what is wanted for the class of goods to be handled.

For the quantities of goods to be handled at this plant, there will be required four sulphur color dye tubs, one to be kept in reserve, and for extra washing, and at least two bleach tubs, besides the regular rotary washing machine and whizzers, of which latter one may be enough for the 500 per day contemplated.

Imperfections in Knit Fabric

I am sending you two cones of 24s cotton yarn together with a piece of fabric knit from this yarn. You will note

the imperfections and sleazy appearance. The various parties concerned have a place for the trouble. One party claims the yarn is at fault, while the other claims the machines are not properly set. It is our desire to have the opinion of a disinterested party, hence our inquiry. (3088)

We have had the yarn knitted on two machines and it ran perfectly. Samples of the web made have been sent to the inquirer, which seem to give a sufficient answer. The two cones were divided into eight bobbins and knit on two different machines. The samples sent by the inquirer show his take-up tension to be too slack or the dial needles not clearing.

Life of Leather Rolls

How many leather rollers should four plants of 55,536 spindles use per week? The plants are divided as follows:

Plant "A" has 16,976 spindles, 11,248 of which are mule, 5,728 ring. This plant operates on an average of 15s and 16s.

Plant "B" is a ring spindle mill of 17,472 spindles operating on an average of about 45s single and ply yarns.

Plant "C" has 11,008 spindles, 7,680 of which operate on cotton yarns on an average number about 17s, and 3,328 operated on waste about on an average number of 7s.

Plant "D" has 10,080 spindles, all on cotton yarns on an average number of about 18s. (2929)

The life of a front roll depends upon the conditions under which it is run. Where a frame at a time is changed and the best of the rolls are used for spare rolls the mills could run about as follows:

A.	11248 ÷ 52 weeks	= 216		
	5728 ÷ 39 weeks	= 147	.....	363
B.	17472 ÷ 52 weeks	= 336	.....	336
C.	7680 ÷ 39 weeks	= 196		
	3328 ÷ 26 weeks	= 128	.....	324
D.	10080 ÷ 39 weeks	= 258	.....	258
				1281

The middle and back rolls will run for 5 to 8 years.

Apparently the correspondent replying to this inquiry separates the middle and back rolls from the front rolls and estimates the life of the former as 5 to 8 years. The front rolls he estimates will last 52 weeks in the case of the mule

spinning mill and the mill on fine goods. On the coarse work he allows 6 to 9 months respectively, and reduces these to weeks to get the number of rolls required per week. It would seem as though the answer must be based on a mill using shell front rolls, in which case they would not move the front rolls back when they become slightly worn. Eight years seems a long time for a roll to last in continuous service, but the correspondent is in a position to know and we would hardly question his statement.—[EDITOR.]

Method of Figuring Noil Prices

Kindly give me an example showing how noils are priced from quarter-blood wools. The quotations at the present writing are about 64 cents. I have a method of figuring noil prices, but it cannot be accurate, as I cannot get this figure. Figuring noils at 64 cents, how would I cover myself if the price should go down? (2921)

The prices for quarter-blood or any quality of noils may differ for various reasons. Between low and high quarter-blood there are about a dozen different counts; thus, while high quarter-blood may bring 64c., very low would sell at 52c. to 56c. Even if a given lot of stock is divided and given to two different combers the price of the noils may differ. If one firm prepares the wool, or if it is indifferently carded, the noil will be full of neps, etc., and is, consequently, not so valuable. If, on the other hand, it is carefully carded and the bits of burr, etc., are well removed before combing the result is a cleaner and loftier noil, which easily commands a higher price.

If the inquirer is a dealer in noils he should make moderately sure that he has a customer who will pay a profit; or if he is a user of noils, to see that the finished goods will cover cost of materials, labor and expense of plant. The prices of noils are determined by the fineness of quality, proportion of knots, freedom from burrs and shives, and, of course, the demand.

[We do not happen to know of any comber who has any fixed method of figuring the cost or selling price of noils, and even if some definite method were used it would be no guide as to what might be obtained in the open market. Another explanation of the situation would be to state that in figuring prices of tops no account is taken of the price that may be realized for the noils or other waste. We know of no manner in which losses on noils may be covered

in the way that this is possible when declines occur in cotton waste and losses are avoided by the sale of cotton futures. When wool and noil prices are not far from normal levels and there happens to be a decline in any grade the owner either sells the material or holds it until there is a recovery in values. Such a policy would be dangerous on the present market, to say the least.—ED.]

Unevenness in Selvage Twill

The selvage on our goods shows a twill more distinctly on one side of the loom than on the other. Is this due to faulty dressing of the warps or is it because there is no weight on one side of the beam? (2966)

If we understand your inquiry correctly the selvage shows a more prominent twill on one side of the cloth than on the other side. If this is due to unequal tension on the yarn in dressing it may readily be determined by feeling the tension on the warp in the loom.

Weight on one side of the beam only would not cause this, unless you had the old fashioned looms where the arbor of the beam is not fastened in by a cap on the box. See if the twill does not show more prominently on the side of the loom where the eye of the shuttle is nearer the entrance to the shuttle box. If you find that it is, the shuttle is rebounding or there is not friction enough on the filling of the shuttle, or there is too much power on the opposite side of the loom which causes the shuttle to rebound. If the bolder twill is on the side of the loom where the shuttle eye is at the other end of the box, the trouble may also be due to there not being friction enough on the yarn, or too much power on the opposite side of the loom, but this is not so likely to occur as in the first instance.

It might be well to see that the shed on the loom closes early on the filling; not too early so that it would cause it to kink on the selvage. Run the loom with as little power as possible and see that the shuttle binders are holding the shuttle, but not too tightly.

Production of Worsted Yarn Mill

What amount would you consider a good day's turn out in a worsted mill spinning say 2/14s yarn, where 35 hands constitute the staff? The force is divided as follows: Four girls in drawing capable of handling 1,200 pounds per day; three spinners on 9 sides, who are able to put the amount

through; four doffers; one bobbin setter, eleven girls in twisting and one bobbin setter; five reelers, two inspectors of yarn, one superintendent, one overseer, one oiler and one band boy. (2949)

The staff seems to be sufficient, with the exception of the drawing department. We will first take up the speed. Though the amount of stock put through the gill boxes may vary, the fallers in first boxes must not drop at more than 300 per minute (double screws) or constant breakages will be the result. At the other end, the inquirer cannot run the spindles in the spinning frame at more than 6,000 to 6,500 without great variation, which is fatal to good spinning. Although these two factors, the fallers in the gill box and the spindles in the frame, very rarely enter into the various calculations used in drawing and spinning, yet they do in fact determine the speed at which the machinery may be run. The speed for all the intermediate processes must be so regulated that they can keep a lead on the work turned out by the gills.

The processes of drawing vary in different mills when dealing with the same kind of stock. The plant referred to is no doubt laid out about as follows:

Process.	No. and Description of Boxes.
1	Two doubled-head can gill boxes.
2	Two 2-spindle gill boxes.
3	One 6-spindle weigh box.
4	Two 8-spindle finishers or one 16 first finisher and one 48-spindle second finisher.
5	Three 48-spindle roving boxes.
6	Five 200-spindle cap spinning frames.
7	Four 200-spindle cap twisters.

If this organization gets through 1,200 pounds per day the output is good. The cap twisters, if not keeping fairly well up, may be run up to 7,000 revolutions per minute. Much time is lost in starting all twisting sides at once. This is not necessary, except in very particular work, as in cases where twisting is for spools and the work is so regulated that two bobbins will just fill one spool. Except in such cases, it is by far the best plan to start the sides in sections.

As for reeling, a very satisfactory system is in operation in many mills. Each reeler's work is kept separate and pay is regulated by the number of gross each individual reeler has turned off. In questions like the above it is a great

help to have some idea of style, number of spindles in doffer boxes, and whether the cap or fly is used in spinning and twisting, and also the pitch of frames.

"Stealing" Sizes

What is meant by the term "stealing" sizes as used in underwear mills? (2953)

"Stealing" sizes, as every knitter knows, means getting a larger size from the frame than the machine is supposed to make. For example, a room on ladies' light-weight goods runs short on size 6. All size 6 frames are running, cut 11 to an inch, 36s yarn, 16-inch frame. There happens to be a 15-inch frame idle, cut 12 to an inch. This frame is started on the 36s with the same number of stitches, or perhaps a few less, and another size 6 is added. The additional needles in the 15-inch make it as wide as the 16-inch with the same yarn, all other things being equal. Therefore, a 15-inch makes the same size as the 16.

Pressing Mohair Lining

Can you give some information on the pressing of mohair linings? (2959)

This is a class of goods that needs very little, if any, pressing. If pressed at all, it must be done very lightly or the goods will show a wavy effect very similar to a watered silk. I do not see why it is necessary to press these goods, as they have a high luster in themselves and if handled right up to this point will look better if not pressed. I have finished and shaped thousands of pieces without pressing. However, if the goods must be pressed the process should be as follows: Rig in the regular way for the hydraulic press and put up in warm press papers and place in the press. Put on a very light pressure with no heat except from the papers. Let them stay in the press from twenty to thirty minutes.

Another method that is fully as good and which does not take so long is to press them on an apron press. This does away with the drag and strain they undergo on the ordinary press. These goods should never be finished without being tentered on a tentering machine, whether they are pressed or not. They must be tentered and rolled on a wood shell as they leave the machines. This leaves the goods in perfect shape, free from wrinkles, and every thread drawn

out and in its proper place. This process adds greatly to the luster. The cloth being examined before tentering is now ready for boxing up and shipping.

Dwell of Harness Cam

If a cam is designed to raise the harness for one pick and lower it for four picks, with one-half pick allowed for the harness to move from bottom to top shed and top to bottom, how many degrees are occupied by the dwell of the cam that causes the harness to remain stationary in the bottom shed? (2955)

I should judge, from the inquiry, that the cam in question is one of a set of five cams designed to weave either a five-end sateen or twill filling flush. As a matter of fact, the ordinary cam located at the middle of bottom shaft does not in itself raise the harness. The cam depresses the harness, and in doing so raises another harness that follows in the order of weaving through the medium of a top roll.

If the cam in question is what is termed a side cam, such as used for pillow tubing and corduroys, this type of cam will raise and lower the harness itself, being attached both at the top and bottom to the lever which at its fulcrum operates inside the cam. In either case the problem is the same, and if we must figure the pause or dwell by degrees I would proceed as follows:

A circle is drawn, and is considered to be divided into 360 equal parts, called degrees. The circle is then divided into five equal parts which represent picks, and are a repeat of the weave which takes place in one revolution of the cam. If, as the inquirer states, one-half pick is allowed for the harness to move from the bottom to the top shed and back to the bottom shed again, one-half of one of the five picks on the circle is made a depression, which leaves four and one-half picks for the pause or dwell. These four and one-half parts equal 324 degrees, therefore, the answer would be a 324-degree dwell cam. A very good explanation of the construction of cams is given in "Warp Preparation and Weaving," by Nelson, which may be purchased from the TEXTILE WORLD JOURNAL book department for $2.25.

Strength of Sail Cloth

Why is it that most sail cloth is manufactured with a view to obtaining more strength in the filling than in the warp,

notwithstanding the fact that it stands equal pressure of wind when used? (2963)

When sail duck is manufactured with a view to obtaining more strength in the filling than in the warp, it is probably because it is going into a cross cut sail where the strips run at right angles to the leach, and the greatest strain, therefore, comes on the filling, which needs to be stronger. This strain is roughly in a direction from the end of the boom to the center of the sail. If the cloths in the sail run parallel to the leach, or up and down, the greatest strain in this case would be on the warp, which to meet these conditions would need to be stronger than the filling.

The inquirer evidently has an idea that there is an equal pressure of the wind on both warp and filling. This is probably true theoretically, but in practice the strain is as above mentioned, and the duck has to be made to meet the practical, rather than the theoretical conditions.

"The Making, Bending and Care of Sails," a pamphlet by Adrian Wilson, and published by the "International Marine Engineering," 1908 Whitehall Building, 17 Battery Place, New York City, is a fine treatise on sails. We believe it is out of print now, but a second-hand copy might be obtained.

Small Steam Power Plant

How much steam should I carry in a 20 h.p. boiler for a 10 h.p. steam engine? On the main steam pipe near the engine is an oil cup. What is the purpose of this and how often should it be oiled, and should thick or thin oil be used? I have had experience on gas engines, but not on steam. Any further information you can give regarding a small steam plant would be welcome. (2942)

The pressure to be carried on the boiler will depend on several things, viz., thickness of plates, size of rivets, method of staying and condition. If this boiler is in Massachusetts the boiler inspector will give a certificate for highest pressure allowed, or if the boiler is insured the insurance company's inspector will give or have sent a certificate. I would put about 60 pounds pressure on this for a trial, but before having steam on this boiler I would put it under a hydrostatic test drawing double the pressure I intended to carry with steam. If only 10 h.p. is required from the engine, the pressure could be anywhere between 20 and 80 pounds, depending on the size of the engine. The higher pressures

are more economical, however, as work is done when the steam is expanding.

I would advise the inquirer to get a book on steam engines and boilers and read thoroughly the construction and operation before he takes any chances. Be sure and see that the safety valve on the boiler is free and that the water gauge works right.

The oil cup on the steam pipe is used for supplying oil to lubricate the valve and piston. No definite quantity can be given for any engine, but I should try about one-half pint of oil for ten hours. It may require more, and perhaps less; this can soon be decided upon by the attendant. Cylinder oil, which is heavy, must be used in this cup. Any of the common oils having a low flash point would carbonize at the temperature of the steam and do more harm than good. A cylinder oil can be purchased from 30 cents per gallon up.

As regards information on running a small steam plant, there are numerous books at low prices which will give this information. If the inquirer would write to the Hawley Engineering School, Boston, they would be glad to give him the titles of some standard text books that are easily understood.

Spots in Weaving Velvet

I am having some trouble with dirty places in light shades which occur in the weaving after the looms have been left standing over night. The cloth is soiled for the first five or six inches. I think it must be due to the reed. After five or six inches are woven everything is all right. The looms are standing in a separate room and are covered up over night. Can you give me a reason for these dirty places? The goods are woven in double shuttle velvet looms.

(3039)

The trouble in this case is evidently due to a dirty reed. One method of cleaning reeds before going to the loom is to pour benzine into the reed and work it up and down, forcing it to the right and then to the left until clean. The weaver should remove regularly all dust that collects in the reed frame. The reed should be cleaned in the loom with all the shafts either lowered or raised.

Trouble with Colored Bathing Suit

We are sending you a bathing suit which was returned to us because it became discolored upon being worn. This suit is made of combination light oxford yarn (cotton and wor-

sted) and "fast" slub dye green worsted yarn. It was used in fresh water. Can you tell us the cause of the brown discoloration and why it should be so uneven, and why the oxford should become discolored below the green stripes? Can you suggest any way of preventing troubles of this kind? (2997)

The peculiar discoloration of the body of this garment below the green stripes is due to the fact that the green was made of colors, one of which, most likely the blue, bled from the green, and formed a horizontal blue band close to the green. The real cause is that the dyer did not compound his shade with dyes of exactly the same degree of fastness. If this had been done, either there would have been no bleeding, or else the green itself would have bled.

The peculiar brown discoloration is difficult to determine. From the fact that it appears only on one side of the garment, and that it does not appear on the inside of the same, it seems to be the result of the sun's action while the suit was drying. It may be that the brown can also be traced to a dye mixture, one of the components of which is not fast to fresh water, and was thereby removed, collecting in other parts of the garment.

To determine if either of these opinions are correct, and if it is of sufficient interest to the inquirer, have him send a new suit or cutting of the identical cloth before it has been wetted with water and I can make accurate tests that will clear up the trouble.

The only way to prevent troubles of this kind is, as intimated above, to select dyes that have the same degree of fastness to both light and water. The following tests are usually made by dyers to determine the value of a dye for bathing suit use:

Fresh Water Test. Immerse the dyed sample in cold water for two hours; wring out and dry with free access of air and sunshine.

Salt Water Test. Immerse a sample of the dyed fabric for two hours in a solution of sea salt (1¼ ounce per gallon), wring out and dry with free access of air and sunshine.

Both of these tests to be repeated three times, and after drying the test piece compare with the standard sample tested under the same conditions, or against the original goods. It should be remembered that the fresh water test for any color is the most severe that can be used, since the solvent power of water is very great.

Yarn Twist, Strength and Contraction

Are there any tables showing the effect of different twists upon the strength of single yarn? I can also use tables giving the degree of contraction in ply yarns with different amounts of twist. Have any been published? (3045)

These are subjects that are receiving increasing attention in mill practice in some quarters, but no general tables are known. In the experience of one who has devoted much time to testing the twists and strengths of yarn there is but one best twist in the great majority of cases. That is to say, that up to a point the strength increases with the twist and beyond that point begins to decline. Thus, with a few turns too few, or a few too many, the tensile strength is appreciably different. Not only is the strength decreased by giving a few more turns, but also the take-up rises out of all proportion. With reference to the contraction in ply yarns, the inquirer is referred to an article in the July 14, 1917, issue of the JOURNAL, which gives the results of tests conducted by the head of the cotton department of the Lowell Textile School. There is no doubt that careful observation of the effect of the twist has amply repaid some who have been to the trouble to make tests with the materials that they are constantly using.

Formulas for Bleacher's Ink

Can you supply the address of a firm making bleacher's ink or a formula for making this ink? The purpose for which this is required is stenciling on bleached goods after they are finished, and to be fast to boiling and laundry work. (3056)

Bleacher's ink is usually made of coal tar and lamp black in varying proportions. Another combination includes a small proportion of carbolic acid. A very good ink for marking cotton goods to go through the bleachery is a black paint made of linseed oil and lampblack. There is an ink on the market which is produced by combining a solution of aniline salt with one of bichromate of potash (or soda) and bluestone. This is mixed on a pad and used with a hand stamp. The other inks may be used with a short, stiff brush and a stencil.

An experienced bleacher to whom we referred this inquiry replies as follows: I do not know the address of any

firm making this kind of ink. I give formulas for making different inks which I have found very good.

INDESTRUCTIBLE INK

Lampblack	1 part
Potash water glass	12 parts
Aqua ammonia	1 part
Distilled water	38 parts

The potash water glass should be of the consistency of syrup. Mixed well together and if the mixture is not stiff enough for stencilling the goods, use a little more lampblack to make a paste.

INDELIBLE INK FOR LINEN

Dissolve 5 parts of lunar caustic, or silver nitrate, in 10 parts of spirits of sal-ammoniac. Add to this solution 7 parts of pure soda, 5 parts gum arabic and 12 parts of water. For stenciling this would have to be made into a paste with something solid to prevent it streaking and running in the process of stenciling. Another formula that is used mostly on packages, bales and boxes is as follows:

Extract of logwood	8 ozs.
Bichromate of potash	1 oz.
Hydrochloric acid	¾ oz.
Dextrine	4 ozs.
Water	½ gal.

Boil the logwood with the water, add the acid and the potash and lastly add the dextrine, stirring all the time. When making inks only the purest materials should be used and care should be taken when mixing as they are easily spoiled.

Wool Consumption in United Kingdom

Can you supply any figures on the consumption of wool and rags in the woolen and worsted mills of the United Kingdom? What is the comparative consumption of worsted mills and woolen mills? (3070)

According to the Journal of the Textile Institute for March, 1917, the approximate weight of clean wool consumed in the United Kingdom is about 350,000,000 pounds

per annum. Of this amount about 230,000,000 pounds are used by the worsted trade and 120,000,000 pounds by the woolen trade. In addition, the woolen trade uses about 200,000,000 pounds of pulled rags and 30,000,000 pounds of noils and wastes from the worsted industry. Thus two-thirds of the total weight used in the woolen industry is represented by pulled rags and wastes.

Napping Wool Blankets

What is the best way of obtaining a short, thick nap on wool blankets by the wire napping process? (3084)

The napping of wool blankets to secure a short, thick nap upon the wire gig requires very careful manipulation. The work cannot be rushed. Much depends upon the quality and length of staple in the stock used. The weave and construction of fabric also are factors. If the cloth is a plain weave, it will require more and probably harder napping. If it is desired to have the weave completely covered, the goods should be napped wet, and before fulling, and in the fulling should be shrunk a little both ways. After this treatment the cloth will in many cases appear as if no napping had taken place, the fabric having an over-felted appearance. By running lightly over the napper, back and face, a nice soft pile can be produced that will give it a full warmth without weight handle.

If the fabric is made with a 4 or 6 harness balanced twill, considerable care will have to be taken, as the nap will come quickly. If put on too heavy the napper rolls will have a tendency to pull out the long fibers and break up the twist of the yarn. It is possible, of course, to err on the safe side, but in napping, as in other things, there is that happy medium which is just right, and this point is only arrived at from careful observation of the make of the fabric, stock, and the effect the gig has upon the work the first or second time over. If the napping is started too light, it can be increased gradually until the point is reached that gives the best results. If, on the other hand, the machine has been set too hard at the start, it should be set off at once. A little fulling or running a short time on the washing roller in a solution of mild soap will help to fill up the fabric and reduce the over-napped appearance. A little straightening out on the gig will put the finishing touch to the blanket.

Some finishers prefer to nap blankets just after scouring

while wet. This enables one to go slowly, and prevents waste in flocking. Napping should be done before fulling, as the fulling sets the pile. The slight napping after fulling produces a soft pile, without digging in and disturbing the long fibers.

Keeping Ring Doffer Clean

Is there an attachment which can be so placed on ring doffers on woolen cards that the rings will be kept continually clean? We enclose sample of wool containing particles of vegetable matter which does not drop out in carding, but will stick to the rings, causing them to fill up continually, and consequently making twitty roping. (3002)

A doffer dickey is made for the purpose of keeping the ring doffer clean. It prevents slivers or other foreign material from remaining in the clothing of the doffer, and also keeps the wire sharp and smooth. It is driven by a positive yet simple arrangement of gearing from the ring doffer shaft, and is supported by a frame. The vibrating motion from the doffer shaft prevents the dickey from filling up opposite the space between the rings. This attachment can be applied to any card.

Napping Cotton Goods

Please describe for us the best manner in which to process an all-cotton fabric to obtain a short, thick nap, with a well covered close face. We are using a 43-inch, 2.65 cloth, soft filling for napping, which receives six or seven runs on the napper, the goods being sheared afterward. The goods are napped a couple of runs in the gray, then bleached and dyed, after which they are given four or five runs, then sheared. Should the goods be napped head end and tail end alternately, and is shearing between the runs on the napper necessary or desirable? About how should the pile and counterpile be set in producing a short, thick, even nap? (3087)

To obtain a short, thick nap with a well-covered face on an all-cotton fabric, about 2.65 yard cloth, it would be necessary to give even more runs than the inquirer states, setting the rolls on the napping machine so that they will not produce too much pile on the preliminary runs. To have a short, thick nap, straight pile, it is necessary to pass the goods through the napper head on, then tail on, then head on again, and so on alternately.

When the desired nap is raised, the goods should be sheared to leave the amount of nap sufficient for a match to the sample. Shearing between runs only tends to make the cloth lighter. If this does not have to be taken into account the inquirer will be able to obtain a closer finished pile by shearing between runs on the napper. At the same time it is weakening the material and reducing the weight.

A laid pile is produced by passing the goods through the napper head on for every run. The wires in the napper disintegrate the fibers of the filling and drags or places them on the cloth just like the hair on an animal's back.

For a straight pile the goods are run alternately head on and tail on, and the runs must be even both ways, otherwise a laid pile will be produced. The fibers that are missed in the head on run are generally picked up on the tail on run.

The closeness of the nap to the fabric will all depend on the closeness of the shearing operation. Shearing between runs will help to get a closer and a thicker nap, but, as stated above, it weakens the material and reduces its weight. The pile and the counterpile should be set very light to obtain a close face, the desired results being obtained by extra runs through the napper. The inquirer should set his napper for a short pile and counterpile; give extra runs to obtain a close pulled nap; shear once in between the napping runs, with not too close a shear the first time; give a few more runs and shear close for the desired finish.

Resist for Worsted Yarn

Please print a formula and method of treatment for a resist for worsted yarn to be used in pieces that are to be colored a medium or dark shade. Also print a formula for a speck dye to use for specking in the dry finishing room. (2865)

The writer has found the following process to be satisfactory for resisting worsted yarn to be used in pieces to be colored a medium or dark shade:

For 100 pounds of material.

Scour, dye and wash and then resist with 10 per cent. acetic acid and 6 per cent. tannic acid. Bring to a boil in one hour and boil for one hour, then turn off the steam and let run for fifteen minutes. Dissolve 2 per cent. tin crystals in 4 per cent. muriatic acid and add this to the above bath and run for twenty minutes without steam. Wash twice.

This resist will stand ordinary tests, but for one that will stand up in nearly all cases the writer has found the following better:

For 100 pounds of material.

Scour, dye and wash. Then resist with 25 per cent. sulphric acid cold for ten minutes, and wash. Start new bath with 25 per cent. tannic acid; bring to a boil in one hour and boil two hours, then add 20 per cent. tartar emetic and boil for three-quarters of an hour. Cool to 100° F. and add 4 per cent. tin crystals and run for one-quarter of an hour. Wash twice. It is not considered feasible to resist cotton yarn, as the cost is too great, and, furthermore, by the proper selection of the colors it is not so necessary.

A good formula for a speck dye to use for specking in the dry finishing room is as follows:

1 lb. hard extract logwood.
1/2 lb. soda ash.
1/5 lb. bluestone.

Dissolve in two quarts of water.

Tension in Winding

We have quite a number of Universal winding machines. All our filling is wound on these machines and no matter what size or quality of yarn is wound the man in charge allows the same weights on the tension. For instance, we have some 24s yarn of a low quality, and some 12s yarn which is of better quality. There are three weights used for tension, each weighing 120 grains. These three weights are left on for the 24s yarn which is only half the thickness of the 12s and of poorer quality. The result is that the 24s yarn breaks very often and is made a lot weaker from having too much weight on the tension. I have explained to the man that when starting the different sizes of yarn on these winders he should take particular notice not to have too many of the weights on the tension so as to strain the yarn, but my advice does not seem to alter his ideas. Therefore, I would like to have you answer the question about tension to be used for different sizes of yarn, which I think will convince this man that better results will be obtained in the weaving department. (2983)

The difficulty in trying to convince the overseer of the error in failing to change tension on yarn with the change in number is probably due to his efforts to produce a cone

equally as dense with the 24s yarn as he is accustomed to get with the 12s yarn. Of course, he should not use the same number of grains weight for yarn one-half the tensile strength of the other yarn. He should use weights approximately two-thirds as great on the 24s yarn as he does on the 12s yarn. This would make 240 grains weight in a tension device. If the yarn is of exceptionally poor quality and of low elasticity, it might even be necessary to come down to 200 grains in weight at the tension device. At any rate, the tension weights should be reduced partly in proportion to the number of yarn and partly in proportion to the quality, striking a compromise between the two.

Elimination of Impurities in Boiler Feed Water

What means are used in connection with steam boilers for the elimination of impurities from the water? (2974)

For taking impurities that pass in with the feed water to boilers, a scum cock is used. The scum cock should be fitted to the shell of the boiler, with an internal pipe, terminating with a pan at the end. The pan should be slightly below the working level. This arrangement is used to scum or cleanse the surface of the water from oils or other impurities, and should be shut before the water gets below the pan, or otherwise steam will be wasted. They should be used frequently where the water is bad or otherwise they are liable to stick. It is better to pipe these separate to waste. They are sometimes piped into the bottom blow-down pipe, and when this method is used, if either valve is leaking it is not so easy to tell which one. The best practice is to keep impurities from entering the boiler. Filters can be used to cleanse the water in its passage to the boiler, and these are made with a by-pass so they can be cleaned at any time. Where a filter is used the scum cock is not required. The boilers should be blown down twice a day by the bottom blow-off, and this takes off any heavy impurities which have settled on the bottom

Preserving Life of Calender Rolls

We are handling a very coarse grade of bleached goods calling for a very high calender finish. In order to obtain the desired finish, excessive pressure, considerable heat and moisture must be used. The calender in question is a five-bowl machine consisting of two combination husk and cotton and three steel rolls, two of which are heated with live steam.

It is my opinion that the calender is too light for the work, but results must be produced and under the strain husk or cotton rolls do not last long. The goods in question are made from very coarse yarns and when bleached, starched and dried are raw and wiry. The finish wanted is one with considerable sheen, as close as possible with a mellow feel. This we obtain, but from time to time the husk rolls give way and when they do are practically useless. I would like to hear of the different means that are taken or applied to preserve the life of calender rolls that run day in and day out under great pressure and heat. (2989)

I would advise the inquirer to get a heavier calender if he expects to continue on this work. It will pay for itself in six months. I have worked on a ten and a sixteen-bowl calender under similar conditions and the rolls did not give out on these machines. The rolls, however, were not husk and cotton. The ten-bowl machine had a heavy metal at the bottom; then one cotton; one paper; one metal, heated with steam; then one cotton; one metal, heated with steam; two cotton, one metal, one cotton. This could be operated as a four-bowl calender with pressure on, or could be operated as a ten-bowl with double pressure; eight 56-pound weights on the four-bowl levers, and ten 56-pound weights on the ten-bowl levers. The 16-bowl machine had seven metal rolls, three paper, six cotton rolls; three metal rolls heated with steam. Seams could not be passed through this machine, and the cloth had to be pasted. This machine could be operated as a seven, ten or sixteen-bowl machine with levers at the different rolls.

I have had some experinece with husk rolls and husk and cotton rolls, but they have not proved satisfactory, as they are too rough, and when the pressure is applied it causes them to open in the grain. If the inquirer will use cotton only and hard pressed, I am sure the results will be satisfactory. Of course he will have to run them in. By this I mean that when the rolls are put in the machine it will be started and let run for about half a day without weight on, occasionally throwing a little water on the rolls. Then put on a little weight and heat and run for another half day or so with the weight and heat on, watching the bearings all the time.

This running in will harden up the rolls. It is necessary that hard pressed cotton rolls, not husk nor husk and cotton, nor a soft pressed cotton roll, be secured. These rolls are treated to excessive hydraulic pressure in the making and

the inquirer should be able to procure rolls that will stand or resist any amount of leverage pressure. I have had rolls burst and give out, but if good rolls are secured no trouble should result. I have used the same rolls for years, only scraping off the edges occasionally with an old file. Husk rolls are too coarse and dry to resist pressure, especially under heat.

If, on the other hand, plenty of work is to be had and it will merit the outlay, I would advise by all means securing a heavier calender, specifying cotton rolls to resist leverage pressure. This can easily be figured out when the lengths of the levers are obtained. If hydraulic pressure is required, the number of tons under hydraulic pressure can be stated. If it is dead set with the levers screwed up as tight as he can screw them he will not be able to state any resistance required.

Shrinking of Hosiery After Finishing

We are manufacturing 176-needle, 3¾-inch cashmere half hose, like sample, using two ends of 1/40 French spun cashmere yarn. We have been having a considerable amount of trouble with these goods in shrinking up after they have been finished. When they are taken from the forms, after being boarded on 10½ board, they will measure 10½, but after the goods have been put away in stock for six, or eight weeks they will only measure about 9½. Could you give us any information regarding finishing of cashmere hose, that would prevent this shrinkage? (3019)

The half hose is knit rather short to start with. The worsted yarn having more elasticity than cotton will naturally shrink more than cotton. I would suggest, first, that a finer yarn be used and knit a tighter fabric which will not make quite so large a tubular fabric, thereby not taking so much length out of the width. Another plan is to use a size smaller cylinder with corresponding number of needles to size, which will require a longer foot and practically no narrowing in boarding, giving little or no cause for shrinkage. Also a wider form can be used with the present size machine.

Crocking of Cheviot Suiting

Enclosed find a sample of grey cheviot suiting. You will notice that upon rubbing with white cotton cloth it crocks. I have several pieces of this nature. Can you tell me what

to do to make the black fast? The black is a logwood color made as follows:

3 per cent. bichromate soda
2½ per cent. tartar
1 per cent. bluestone

and dyed with 18 per cent. extract hematine. (2995)

The condition of this sample seems to indicate that the dyeing was done too hurriedly; and that sufficient time was not allowed for the logwood to combine properly with the mordant. On the other hand, there is a possibility that the scouring of the pieces was not done as thoroughly as they might have been. These two phases of logwood dyeing are the most common, and where crocking is noted, they may be suspected. In the present case, there is no way to make the black "fast," but the loose black on the goods may be washed out with the aid of fuller's earth. This treatment will not only clear the goods but make them soft and pliable.

I note on page 31, August 11 issue of the JOURNAL an inquiry number 2995. The party complains of crocking with the following formula:

3 per cent. bichromate of soda
2½ per cent. tartar
1 per cent. bluestone

and dyed with 18 per cent. hematine.

In my opinion the crocking comes from an excess of dyestuff uncombined with a mordant, and there is absolutely no use for using bluestone when the oxidized extract is used. This is a splendid formula to use provided you substitute logwood extract for hematine and diminish the amount of logwood extract used.

I am enclosing a piece of cloth that has been dyed as follows:

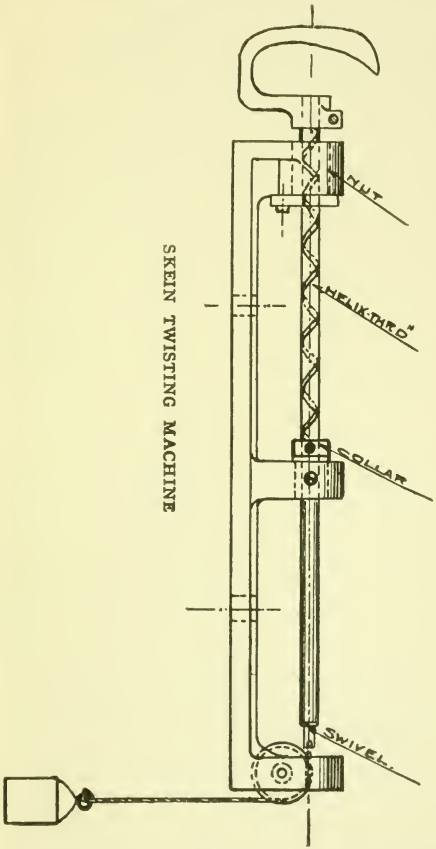
3 per cent. bichromate of soda
3 per cent. half refined tartar.

Goods are mordanted at a boil for one and one-quarter hours, rinsed and dyed in a bath containing 12 per cent. of our Diamond "Y" logwood extract and one-half per cent. of bluestone. The goods are brought to a boil in about fifteen minutes and dyed for an hour and thirty minutes.

Skein Twisting Machine

Will you please give us the names of manufacturers of machines for twisting skein yarn into hanks? (2826)

The illustration shows a skein twister made by Wegmann & Co., Baden, Switzerland, that is used with very good re-



sults. Many yarn manufacturers make their own equipment for twisting skeins.

Machine Sizes for Cashmere Hose

What is the standard size machine for knitting cashmere half hose; also what yarn should be used on a 188 needle, 3½-inch cylinder, 48 gauge machine, making a fine cashmere hose? Also what yarn or thread is used to loop the above? (3022)

A hosiery manufacturer of long experience replies as follows: The standard size machine for knitting fine cashmere half hose is 200 needle, 3¾-inch cylinder, 48-gauge, and this size machine is also preferable to the 3½-inch for knitting hose if the legs are to be knit on the same machine. Two strands of 1-45s worsted makes a very fine feeling hose and doubling the same with a slight twist improves the wearing qualities of the goods. The size of yarn is usually the most profitable for 48-gauge machines, but if the buyers demand a lighter weight 1-45s and 1-50s, could be used. The bulk of cashmere goods are plated, being 1-45s worsted over 1-30s fast colored cotton and dyed in the piece. These goods should be well reinforced with 1-70s worsted or 1-50s or 1-60s fast colored cotton yarn; 2-36s yarn will probably be best adapted to the machines for looping the above. It pays to get a good grade of thread for the loopers.

Dram and Denier

I understand that 1 dram silk measures 256,000 yards to the pound, but would like to have you explain what is meant by the expression 14/16 when applied to silk. (3040)

Silk is numbered by the dram and denier systems. The dram count indicates the weight in drams of 1,000 yards or the weight in pounds of 256,000 yards. The denier count indicates the weight in deniers of 400 aunes, or the weight in drams of 17,352 yards, or the weight in pounds of 4,442,112 yards. The denier and aune are old French units of weight and measure. The English equivalents of the denier-aune system, as given by different authorities, vary slightly, but the variations are negligible in practice. The expression 14/16 as applied to silk means that the silk is not lighter than 14 denier nor heavier than 16 denier, the average being 15.

Constructions for Denims

What number warp and filling is used in the making of denim? (3031)

Denims are made in a heavy grade for railway and machinist work, and in medium and light grades for a variety of purposes requiring a good, strong fabric. The standard colors are blue and brown. The width is usually 27 inches, laid 28½ to 29 inches in reed. The take-up is approximately 10 per cent. in warp.

Three common constructions are as follows: 2.20 yards per pound, approximately 7¼-ounce goods; 68 x 44, 27 inches; 8s warp, 10½s filling. Carded stock, warp dyed blue or brown.

2.40 yards per pound, approximately 6¾-ounce goods; 68 x 44, 27 inches; 8s warp, 14s filling.

3.20 yards per pound, approximately 5-ounce goods; 60 x 40, 27 inches; 10s warp, 15s filling.

It is unusual for the sley on these goods to exceed 68, or the pick to exceed 44, or for the warp to exceed 10s. The filling governs the yards per pound or ounces per yard. There are grades between the ones mentioned above. The first two are very good denims, the third is a medium. A light or low grade denim would be 4 yards per pound, or 4 ounces per yard.

An analysis of the two finished cloths gives the following particulars:

8-ounce denim; 66 ends, 39 picks, 9s warp, 6s filling; 28 inches wide. 2.20 denim; 65 ends, 41 picks, 7½s warp, 10½ filling, 28 inches wide.

Adjustment of Dial, Cylinder, Tension and Stitch

Kindly inform me the best way to take the sharp edge off dials and cylinders of the Wildman body machines. Also what can I do to stop the take down tension from pulling tight at the beginning of a web and slack at the finish? Our yarn is very tender. I am running machines with short cylinder stitch and high dial. Please advise if this is proper for best results. (3042)

A superintendent replies to the above questions as follows: There is only one way to take the sharp edge off dials and cylinders, and that is to return them to the builders to be filed and recut. This is expensive, but it means practically a new cylinder and dial that will oftentimes outwear a new one. Knitters have many schemes to overcome the saw edge, such as laying a smoothing file on top, across the cylinder and rubbing gently, or putting in lathe and using a file. However, the edge will rarely come true, resulting in streaks and tight or loose wales. In fact, on first-class work this is not tried;

even on cuts of less than 10 to the inch, it has bad effects in more ways than those mentioned above.

It is not clear just what is meant by web pulling tight at the beginning and slack at the finish, unless it means the web is rolled up after knitting. This can be stopped only by having a box under the frame for the goods to fall into. That is the working practice today. It does not help in any way to roll up after knitting, unless to save floor space.

It does no harm to run a dial high on a tender yarn. A short cylinder stitch is good practice, where it can be done, but the high wale effect, so much sought after by the buyers of the better grades, is lost. Again, the high dial means a narrow width. Many concerns run the dial so low that a needle will not go between cylinder and dial. However, on very tender yarn a short cylinder stitch is good practice, provided there is no other way to make perfect goods.

Temperature and Spindle Lubrication

Please tell me at what degree of frictional heat a spindle should run, turning 7,500 r.p.m., spinning 22s warp hosiery yarn, Whitin gravity spindle. For example: Room temperature 90° F., at what temperature should the oil in the spindle base be to give perfect lubrication? Band pull 3 pounds. (3099)

To exactly answer these questions would require a series of very careful and quite expensive experiments with a given oil and a frame fitted with tape driven spindles, with the rolls and builder disconnected so as to record only the power required to drive the spindles.

With delicate electrical instruments for recording the amount of power being consumed and means of heating the spindle bases to any reasonable temperature and also means for maintaining constant temperature of drum bearing, the test could be made for any oil.

Assuming that the "perfect lubrication," mentioned in the question, means with the least friction, then the room temperature would have nothing to do with the question. The viscosity of an oil, or the ease with which it will flow, is an important factor in determining its lubricating value. And as the ease with which it flows depends upon its own temperature, it follows that room temperature would not affect the question except as it render it more or less difficult to maintain the temperature required to make the oil least viscous.

The most exhaustive tests that we now know of were made by the late C. J. H. Woodbury, who conducted a very long series of experiments to determine this very question. He designed a machine calculated to reproduce as nearly as possible the conditions of pressure and surface speed of a spinning spindle, and showed as a result of his work a decrease in the coefficient of friction as the temperature of the bearing rises. His experiments ran as high as 130° F., which is as high as a properly oiled spindle would probably reach. The results of his experiments are published in Vols. 1 and 6 of the Transactions of the American Society of Mechanical Engineers.

A machinery designer to whom this question was put replies as follows: "This inquiry cannot be answered by a positive statement, as various spindles show different phenomena of heat generation. No positive data is known by the writer to be available. Heat in the lubricating oil of a spindle is produced both by molecular agitation of oil from the whirling motion set up, and by absorption of frictional heat from the rotating parts, a factor largely determined by condition of surfaces affected by wear.

"A group of Whitin gravity spindles mounted in the regular manner has been observed by the writer to run at temperatures varying from 80° F. to 150° F. after a five-hour run at 8,000 r.p.m. Between these extremes would seem to be a fair mean, of 115° F. temperature of lubricating oil with room overheated to the extent shown by temperature of 90° F., which is about 15 to 20° above a suitable one."

At our request a spinner made a test on a Saco spinning frame under the following conditions: r.p.m. 7,200 diameter of spindle whirl, 15/16 inches; yarn, 24s. Temperature of room (middle of room at 4:30 p. m.), 88° F.; temperature of oil in spindle base registered 95° F. The oil in spindle base was not in any way discolored and was not fresh oil. This showed the lubrication was satisfactory. In the opinion of this spinner it is possible to give only an approximate answer to a queston of this kind.

Saving Materials in Bleaching

I am a bleacher and finisher of long standing, but it seems to me that I am using too much bleaching powder. This last few months I am getting on an average of 335,000 yards

from a drum (standard size) of bleaching powder. The weight of the goods of course varies, but on a general average they would be about 38 inches, 6.00, 60 x 52. I would like a few comments from some of my brother bleachers on this subject. I am at a Southern bleachery where things are done a little differently from the North and the East.
(2990)

It seems to me that the results indicated in this question are very good indeed. If the drum referred to contains 750 pounds of chloride of lime and the goods' weight around 6 yards to the pound, it means that the poundage bleached per drum is 55,833 and that 1 pound of lime is bleaching 75 pounds of goods. An extended test which I have just completed, covering three months, shows that the amount of goods bleached per pound of lime is only about two-thirds of the above.

The class of goods bleached in this test were of different kinds and constructions, but a comparison of the results obtained would indicate that the results given in the above question are first class. To have a fair basis for comparing the results obtained it would, of course, be necessary to make tests under conditions that were practically similar and make them on the same kind of goods. The degree of whiteness wanted will, of course, affect the amount bleached per pound of lime to some extent.

The inquirer is doing well if he can get the amount of cloth through on a drum of bleaching powder. I presume he means a drum weighing between 400 and 500 pounds. I have used the drums and the casks, the large casks holding about 800 or 900 pounds and some even over 1,000 pounds. The climate being warmer in the South it will require much less chemic to do the work. I find that in warm weather I can get along with about one-half as much chemic as I use in the winter weather.

From the weight of goods quoted I presume the caustic boil is used, one operation in the chemic bath, so if he produces 335,000 yards of cloth from one drum of bleaching powder I do not see that he has any complaint to make. I am using about 1,200 to 1,400 pounds to produce 300,000 yards of cloth, but the goods are heavier, some requiring chemicing twice, while some of the goods that are heavier than those of the inquirer I run through the chemic bath only once.

I must admit that I have not one of the best systems for

mixing the powder, having only one mixer and one settling tank, and sometimes I have to draw from the mixer before the powder is settled, not giving it time to settle clearly in the settling tank. It is a question of process and the amount of chemicing the goods require, plus an up-to-date method of mixing and settling the chemic that will settle the question whether too much bleaching powder is being used.

I have tried various methods of reducing the powder, but generally if I am successful in reducing it this is due to the fact that the goods are lighter. I have even had more length in and used less chemic powder, and another week I would use a lot more powder and produce less length. It has puzzled the management to understand why it took more drugs in the bleachery to produce less length. Less boiling will require stronger chemic. Bad rollers on the squeezers and washers will also be the cause of having to use stronger chemic on account of carrying too much surplus water in the baths. Improper mixing and using muddy chemic will also be the cause of having to use stronger chemic. I consider the production a good one, both in length and the amount of chemic used, and that the inquirer has no cause for complaint.

Backwashing Dyed Top

I would like to have some information about backwashing tops that have been dyed. What makes so much dust in the dyed sliver after it is backwashed? Is it because it is not washed properly? What causes a good many small cut lumps in ¼-blood dyed top after backwashing and gilling? How strong should the suds be in the bowl for tops dyed black? (3021)

The superintendent of a worsted mill to whom this question was referred, replied as follows: The dyer can make it hard for the man who is in charge of the backwashing and gilling departments if he neglects to scour the tops properly. A grease top when dyed, and especially when dyed black, will felt and has a tendency to gumminess, and it is pretty hard to scour it out in the backwashing for the reason that the slivers pass too quickly through the bowls. The material being felted up, the liquor does not penetrate thoroughly enough to scour out all the dye and grease substances, which makes it very hard to dry and worse to gill. It is difficult to dry properly in the time that the slivers are passing over the steam cylinders. When the sliver is worst matted up a

lot of the small cut lumps will be made and it is hard on the fallers as well as on the aprons.

To overcome this difficulty arrange some small knives on the backwasher to split open the material just before it goes into the bowls, so as to give the stock a chance to be scoured thoroughly. This will make it softer and more open and will give the material a chance to dry without any difficulty, and also improve the gilling. In scouring black tops a little ammonia added in the first bowl will help a good deal in removing all the loose dye and gummy substance.

Dyestuff Calculation

Will you kindly show us how to figure the following problem? Given a dyestuff of 125 per cent. strength; wanted a dyestuff of 100 per cent. strength. How much salt should be added per 100 pounds of dyestuff? (3012)

This problem is confusing because the ratings of 100 and 125 are not actual percentage composition. If we understand the question correctly it is simply a problem in proportion, the first part of which might be stated as follows:

$$125 : 100 :: 100 : X$$

The letter X represents the amount of dyestuff of 125 per cent. strength to be used to make up 100 pounds of a dyestuff of 100 per cent strength with the admixture of salt. Multiplying 100 by 100 and dividing by 125 gives 80 as the value of X. This 80 pounds of 125 per cent dyestuff and 20 pounds of salt make 100 pounds of a dyestuff of 100 per cent strength. The second part of the problem might be stated as follows: If 20 pounds of salt are added to 80 pounds of dyestuff to make 100 pounds of a dyestuff of 100 per cent strength, the amount of salt to be added to 100 pounds of the 125 per cent dyestuff to give a coloring matter of 100 per cent strength would be:

$$80 : 20 :: 100 : X,$$

which gives 25 pounds of salt as the answer.

It might be simpler to say that the two colors are to each other as 4 is to 5. Then four-fifths of 100, or 80 pounds of one will be equal to 100 lbs. of the other. We now have equal amounts of dye strength, but in unequal weights of

dye material. Next add 20 lbs. of salt to the 80 lbs. of strong dyestuff and get 100 lbs. equal to the 100 per cent type. To reduce 100 lbs. of the strong color to the 100 per cent type is now only a matter of proportion:

80 (of dye) : 20 (of salt) :: 100 (of dye) : X (salt)

X works out equal to 25, the required answer.

Equipment for a Hosiery Mill

I am contemplating erecting a small hosiery mill in the South. Will you kindly state the complete equipment required and the cost of same for a mill knitting and dyeing 200 dozen men's seamless half hose per day, also number of operatives that would be required. Can a hosiery mill of this capacity be run successfully, or is it too small?

(2829)

The equipment required for a 200-dozen mill on men's half hose would depend somewhat on the grade of goods to be manufactured, inasmuch as the capacity of a knitting machine depends altogether on the gauge. A coarse gauge machine will produce considerably more than a fine gauge machine, for the reason that the machine can be operated at a much higher speed, and in addition to this there are less stitches or courses per inch. However, as 220-needle goods are the most popular gauge at present, I will base my estimate on 220-needle equipment. The following gives a list of equipment and number of operators required:

40 knitting machines	14 operators
10 ribbers	1 operator
8 looping machines	8 operators
1 laundry machine 3 dye vats	1 operator
36 metal forms for drying 1 hot press	2 operators
1 ticket machine	1 operator

In addition to this, there would be required 1 repair man, 4 menders and inspectors, 1 timekeeper, shipping clerk and taking up work, 2 maters and folders, 1 stamper and boxer, making a total of 36 operators.

The cost of equipment would be about as follows or a little higher:

40 knitting machines, $165 each	$6,600.00
10 ribbers, $110 each	1,100.00
8 looping machines, $90 each	720.00
1 laundry machine	250.00
3 dye vats, $60 each	180.00
36 forms, $10 each	360.00
1 ticket machine	110.00
Shafting, pulleys, couplings and transmission	150.00
1 5-h.p. motor for knitters 1 1-h.p. motor for ribbers 1 ½-h.p. motor for loopers	350.00
Total	$9,820.00

In addition to this would be the cost of installing machinery also bins, racks, lights, etc., which would bring the total cost to about $12,000. As to whether or not a mill of this size could be made to pay would depend altogether on circumstances and also on the class of goods manufactured.

The location of the plant would also have much to do with whether it paid. The principal drawback to a mill of this size is the overhead expense. It would not be advisable to erect a building for a plant of this capacity. The plant would require about 10,000 square feet of floor space, and a building would cost about $15,000 which would be entirely too much of an investment for the output. I would say that the only way that a plant of this size could be made to pay would be to locate in a small town where rental would be low.

The party furnishing the capital should also be an experienced and practical hosiery man who could supervise the entire output, including the fixing of the machines, as in a plant of this kind the overhead will absorb all of the profits unless it is kept down in this way. However, a practical man who could look after the plant personally, doing all of the fixing and supervision, could make a very satisfactory showing providing, of course, he was able to merchandise his goods at market value.

It will be readily understood that the greater the output the less the overhead charge per dozen, inasmuch as overhead expense is largely made up of indirect charges that remain the same regardless of output, such as taxes, interest, repairs,

supervision, heat, light, etc. For example, in an ordinary sized plant, the organization must be maintained whether the output increases or decreases, and the surest and simplest way to reduce the overhead and increase the profit is by increasing the output. In a great many plants, where the overhead is high and the profits small, it would be a very simple matter to increase the profits if some means could be found to increase the output and sell the product.

Warp Yarn Sticking Together in Beaming

We are enclosing a piece of warp yarn which we would ask you to examine and advise us why this sticks together when beaming. (3102)

There are several reasons for yarn sticking together in beaming. A first glance at the yarn led to a belief that the cause of the sticking together was acids used for the purpose of fastening the color, but a little soap and water soon dispelled this illusion, as we have seldom seen a more fugitive color. It might be caused by loading the yarn for the purpose of obtaining the desired shade, but we think in this instance the stickiness was caused by too high a pressure of steam in the dye box when the yarn was passing through it. If too much steam is used it has a tendency to blow the liquid to one side, thus allowing the steam to come in direct contact with the yarn and open up the fibers. This condition cannot readily be seen when the yarn is wet, but the process of drying will cause the opened fibers to cling together, thus producing the stickiness complained of. I might also add that the same condition obtains in chain sizing.

Conditioning Room for Yarn

We want to construct a conditioning room for a mill of 12,000 spindles, in which to put the yarn so it can be brought up to the required moisture before shipping. Our numbers run from 6 to 13 and from 3 to 6 ply. Our daily production is from 7,000 to 8,000 pounds. The building is to be a brick structure and about 20 feet from main building, and we want to use hot water from condenser system, provided it would furnish sufficient moisture. Please state what temperature the water will have to be if used in this connection, or whether we can use it at all. (3091)

The suitability of the water in question depends upon its freedom from organic contamination only, if humidifica-

tion of the yarn is to be accomplished by the so-called "natural" method, whereby the damping of the yarn is obtained by exposure of yarn in boxes to an atmosphere rendered humid by a brick floor saturated with moisture. Anything in the nature of sewage contamination would render the water useless and a nuisance in many ways. Chemical analysis should be resorted to, and whether used in this way or as a spray direct on the yarn it is best to use a water but little inferior to that used for drinking purposes.

There must be no iron in the water if it is to be sprayed on the yarn. If the water is pure, the temperature of condenser water should be rather an advantage than otherwise over cold water. In many "conditioning" plants hot water is used with advantage, for it gives more rapid penetration of the cops than cold. An elevated temperature of the water and air (provided that saturation of the air is effected) is advantageous, because it enables a cubic foot of air to carry so many more grains of water.

It is difficult to answer the question fully without knowing the particular process to be adopted, whether the "conditioning machine" with circulated humid atmosphere, the blanket machine, the immersion method or "natural" conditioning. Generally speaking, however, it is worth while to use very good water to avoid possibility of mildew, to keep the conditions sanitary and to avoid stains of all kinds. "Water from condenser system" may, of course, be cooling water or may be the condensed steam itself, and in this latter case the amount of oil present may make it inadvisable to use it for conditioning. The meaning of "provided it would furnish sufficient moisture" in the question is obscure.

"Hank" and "Skein"

There is a controversy in this office, occasioned by a criticism made by a customer regarding the meaning of the words "hank" and "skein." We use the word "hank." A customer criticized us saying it was misleading. I find, however, that manufacturers do not agree as to what is the right term, as one manufacturer uses the word "skein" while others use "hank," apparently for the same quantity. I find also that authorities are conflicting and confusing, and should be very glad to know exactly what is the correct word to use and the authority for it. (2992)

It is difficult to give any clear-cut definition of the words "hank" and "skein." They are rather loosely used to

indicate the same things, and one of their chief differences is that "hank" is more commonly used in England, and "skein" is more commonly used in the United States. Strictly speaking, we suppose that the term hank should be applied to the unit used in yarn calculations, the number of hanks of 560 yards in the case of worsted, or 840 yards in the case of cotton, that weigh one pound, indicating the yarn count. "Skein," of course, generally refers to the form in which the yarn is put up and does not indicate any special weight or length, skeins being of the weight that can best be handled by the purchaser. If the mill or other purchaser can handle it best in 4-ounce skeins or 6-ounce skeins, he orders this quantity in a skein.

Trouble in Sizing Warps

How can we overcome the trouble we are having with our sizing? We are making 96 by 100, 40-inch goods, about 50s warp and 52s filling, with single bank drop wire motion. We cannot get the warps sized heavily enough to prevent chafing and little balls forming between the harnesses and reed, without having the size so heavy on the slasher that the yarn breaks at the split rods. We also have trouble with our sizing falling off around the slasher and under the loom. We think this is due to the fact that our yarn is sized very heavily. (3069)

Evidently the size is not cooked sufficiently to enable it to penetrate the yarn. The size remains on the outside of the yarn, is easily rubbed off and drops on the floor. With a cloth construction such as given, there ought to be no trouble with the size providing it is made right. Much depends on the proper mixing of the different ingredients, and the proportions of the same, as it is obvious that what will give good results on one class of goods will not give satisfaction on a different grade of cloth. The inquirer does not state how his size is made, so it is impossible to say whether the formula can be expected to give good results.

We note in the October 20 issue of TEXTILE WORLD JOURNAL an inquiry, No. 3069, with reference to difficulty in sizing warps. From experience similar to this we would suggest as a remedy for this the use of a revolving split rod between the last squeeze rolls and the slasher cylinder. Such a rod would separate the warp before it was dried on the cylinder

and would tend to eliminate the trouble mentioned by the one making this inquiry.

JOHN D. JONES,
Union-Buffalo Mills Co.

Twitty Work in Carding

I would like some information on how to overcome lumps and twitty work. We are having trouble on one of our finisher cards in particular. The top spool on this card is all right, but the bottom spool is very lumpy and twitty. We have just had the ring doffers ground and smoothed up, but it didn't seem to do much good; the lumps still appear. When watching the card, small lumps can be seen coming up between the wipe roll and apron rub and then the ring doffer takes them. The wipe rolls are covered with corduroy. (3051)

Be sure that the rings are in proper shape by being evenly ground and perfectly smooth, and the top and sides of the wire free from books and burrs. If the rings are rough or burred, take a strip about twice the size of a hand card and clothe it with new fancy wire. Use this to polish and smooth up the rings when grinding. This will not slacken the wire as a hand card is liable to do, and the long fancy wire will get down between the wires of the rings and smooth the sides of the wire. Wire wipe rolls, when properly set to the rings, will keep the rings smooth and in good working order.

The fact that the unevenness mentioned is noticed in the web as it leaves the rings, seems to indicate that the fault lies with the bottom ring doffer being set too far off from the cylinder, which tears or strains the web, causing twits. The doffer should be set up close to the cylinder to prevent this trouble, the variation in weight between the top and bottom doffers adjusted by the change gears. It might also be advisable to look after the speed of the wipe roll, to see that it is not running too fast for the speed of the doffer.

Wrinkles in Woolen Goods

I would like some information on mill wrinkles, or so-called fulling mill marks or washer marks. How can they be removed and what machinery is necessary for removing them and who makes the machine? (3116)

It is difficult to give the right remedy for finishing room troubles without being "on the spot." The following sug-

gestions may be helpful: For fulling mill wrinkles prevention is better than cure, for when once they are well set in the cloth it is nearly impossible to remove every trace of them. Goods that are closely constructed are most likely to have them because they are less pliable, and so do not change their position or folds in the fulling processes as much as where the weave is open and the yarn is less crowded. Pliability in fulling is very important. If the soap is thin and watery it does not create the desired bulk and lubrication, so that wrinkles form more readily and hold their sameness until they become set. Excess of alkali tends to produce them, and any trace of acid in the stock, destroying the life of the soap, is sure to cause them.

Aside from the condition of the soap and the construction of the cloth, the trouble is often brought on by the cloth being run too closely confined in guides, eyes and stretchers. From the time the cloth leaves the rolls until it enters them again it should be given every possible chance to open and change its position, and the pressure of the top rolls should not be excessive. Tacking the selvages together is an advantage, as the air inside the fold tends to keep the cloth open.

Frequent overhauling, or shaking out, is an advantage. There are machines for stretching and rolling the cloth while wet that are of benefit. As a rule, there are streaks that are more heavily felted where the wrinkles occur, and no after-process can entirely remove them unless they are closely finished goods, when gigging and shearing might help.

A good bodied soap of proper strength and the goods run free and open, devoid of strain or friction, should be a benefit. If the goods are dyed in the piece the trouble is aggravated at this point, and the boiling makes the wrinkles more permanent.

Table of Weights for Roving

I would like a scale of weights for fifty yards of roving from ⅞ of a run to 7½ runs. Can you give me this information? (3092)

As we understand the inquiry, a scale is wanted that will give the weight of 50 yards of roving from the card for the size yarns mentioned. Owing to variation in quality of stock, methods of handling, preparing, carding, etc., it is rather difficult to get out a table that is entirely practicable in every instance. However, the following figures will serve

as a basis and in many instances will prove satisfactory. In cases where it may be thought necessary, the weights can be varied to suit the conditions.

SCALE OF WEIGHTS FOR 50 YARDS OF ROVING.

Yarn size. (Runs).	Grains.	Yarn size. (Runs).	Grains.
7/8	290 to 300	4 1/4	95
1	280 to 290	4 3/8	93
1 1/8	265 to 270	4 1/2	90
1 1/4	250 to 260	4 5/8	85
1 3/8	240 to 245	4 3/4	83
1 1/2	190 to 220	4 7/8	82
1 5/8	210 to 220	5	81
1 3/4	190 to 200	5 1/8	80
1 7/8	180	5 1/4	78
2	170	5 3/8	77
2 1/8	167	5 1/2	76
2 1/4	165	5 5/8	74
2 3/8	160	5 3/4	72
2 1/2	153	5 7/8	71
2 5/8	149	6	70
2 3/4	142	6 1/8	69
2 7/8	135	6 1/4	68
3	130	6 3/8	66
3 1/8	125	6 1/2	65
3 1/4	120	6 5/8	64
3 3/8	115	6 3/4	62
3 1/2	110	6 7/8	61
3 5/8	105	7	60
3 3/4	104	7 1/8	59
3 7/8	102	7 1/4	58
4	100	7 3/8	57
4 1/8	98	7 1/2	56

This table is figured from the yarn weight on the basis of 50 to 55 per cent. draft for the fine counts from 5 run to 7½ run.

Distinct Twill in Drill Fabric

How can I obtain a good twill on drills? We import a cloth from the United States in the gray, which is called American drill. The twill is very distinct. We make drills here in South America, but the twill does not show up as

it does on the imported fabric. We weave the cloth in 6 healds, 2 in a reed. The cloth shows up very reedy if 3 in a reed are used and there is very little twill. (3136)

The principal fault with the South American drill is that the inquirer has used a right hand twist warp and a left hand twist filling. The stock used to make the yarn is of low grade, the cotton is dirty, the yarn is uneven and the cloth itself very streaky. The sample of American goods is made from a clean white cotton, well spun into yarn and very even; both warp and filling are right hand twist. The twist has a big influence on the twill; the more twist the better the twill will stand up. We would avise the inquirer running this on three cotton harnesses on a cam loom, and drawing 2 ends in each dent of the reed. The selvage should be either plain or a 2 and 2 tape; the latter is preferable. There are 72 warp threads and 48 filling threads per inch in the American sample, while the other counts 72 warp threads and 52 filling threads per inch. The slight difference in the pick will not make any difference in the prominence of the twill lines. Both samples are approximately 14s warp and 20s filling.

Bleaching Union Knit Goods

We would like a formula for bleaching knit goods composed of combed peeler and worsted yarns, the fabric being about 60 per cent. worsted, using bisulphite of soda and sulphuric acid. The bisulphite of soda being 32° or 36°. We would like information as to the proper strength to use based on 100 pounds of goods in about 100 gallons of water. (2797)

This inquirer fails to state whether the strength of the bisulphite of soda is 32° or 36° Twaddell or Beaumé, although I am inclined to believe that he means the Beaumé scale, and on this assumption reply as follows:

A cold bath is prepared by adding 50 to 54 pounds of commercial bisulphite of soda of 35° or 36° Bé. strength (corresponding to about 64° Tw.) to 100 gallons of water, mixing well, and then pouring in slowly with constant stirring 25 to 27½ pounds of oil of vitriol, previously diluted with a few gallons of water.

Enter the well wetted-out and scoured knit goods, immerse well for several hours, or until a swatch shows that the bleach has progressed far enough. When the proper degree of bleach has been secured, remove the goods, allow

to drain thoroughly and then sour off in a fresh cold bath containing 35 pounds of oil of vitriol for each 100 gallons of water. Wash thoroughly to remove the remaining traces of acid, and dry. The bisulphite bleaching process is good for union goods of all kinds, and on account of its relatively low cost, is used to a considerable extent.

Scouring Wool Hosiery

Can you give us a process of scouring women's and men's all wool cashmere hosiery that will thoroughly remove all grease and impurities? We do not wish to bleach same as we want to retain the creamy cast, but do not want them yellow looking and greasy feeling. Of course, we understand the quality of wool has a lot to do with results. What we would like is a process that would absolutely cleanse any wool after same is knit into hosiery. (2981)

The inquirer should have very little trouble in getting his goods clean. Use a good soap as near neutral as possible. Put the steam pipe in a barrel and make up soap to the consistency of a fairly thick syrup. Use a fuller of the Kicker type. See that the goods are covered with warm water, not hot. To 100 pounds of goods add about 6 gallons of the soap solution, and if neutral soap, add about ½ package of soda ash. About 1 gallon of ammonia will help to cut the grease and dirt. The grease must all be cut in the first wash or it cannot be gotten out. Turn out the first water and give a light rinse, after the grease is all cut, then give another wash with half the amount of soap. Run until the goods start fulling, then run the water off and give a good rinse and extract. The goods are then boarded and dried in not too high a temperature.

Backwashing Dyed Top

I would like some information on the backwashing of tops that have been dyed.

1. Can top be dryed properly on an up-to-date Prince, Smith backwasher, cylinder all inclosed with a fan, used for backwashing carded sliver?
2. What makes so much dust in the dyed sliver after it is backwashed?
3. Is it because it is not washed properly?
4. What causes a good many cut lumps in one-quarter blood top after backwashing and gilling?
5. How strong should the suds be in the bowl for tops dyed black?

6. What temperature can the dryer be without burning the sliver, and have the sliver come off the gill box in good condition? (3073)

1. Certainly if the machine is not loaded too heavily, and if the slivers are spread evenly over the surface of the drying cylinders.

2 and 3. The dust, which consists of particles of dyestuffs, should as far as possible be taken out before the tops go through the backwasher. The best way is to pass the tops through a gill box with a fairly long draft, and not too finely pinned over in the fallers. Thus the main part of the loose dyestuff will drop off. If not gilled before backwashing, the dyestuff clings closer to fibers when the tops come in contact with the suds, and results in large amount of dust in subsequent processes.

4. The twist in the sliver is the main cause, particularly if the backwasher is fed by drawing sliver from inside of top. Before backwashing or even dry gilling the tops should either be unwound or else run out of a creel and the sliver taken from the outside of top. If this is not done, cut work will result, which will show itself as slubs in the finer drawing and spinning processes, and slubs are about the biggest fault a yarn can have.

5. First, as to temperature of sud; 110° F. is plenty hot enough for the first bowl, and 100° for the second bowl. Second, keep a moderately full bowl with just so much soap solution added in first bowl that when a strip of tumeric paper is put in it turns slightly red in color. This even is rather over than under the mark. Too much soap in the sud tends to make the slivers ropy, while if too little is used there is a tendency to grind stock in squeeze rollers.

6. Under ordinary circumstances, with the backwasher named it is almost impossible to burn the slivers, but they can be made too dry. If the stock is to be recombed, the heat on the cylinders should be so regulated that when the sliver is put into the tester it should dry about 12 drams to the pound. If it is going direct to the drawing, 10 drams would be sufficient.

But the question arises, Why backwash dyed sliver at all? If the sole object is to get rid of the dust, or at least most of it, this can be done by putting the stock through three gill boxes and then taking it direct to the punch box, if it has to be combed on the Noble comb. The first should be a strong box pinned at not more than ten per inch; the

second box pinned at twelve per inch, and the third at fourteen to sixteen per inch. Have as broad a bed of fallers as possible, especially in the first box so that a fair weight of stock can be put through in a thin sheet. Draft easily at the first box, increasing to as much as it will stand in the second and third boxes. This not only makes the stock easier to work in the subsequent processes, but causes the dust to fall out freely. If required, either water or oil can be put on at the delivery end of the second box by the ordinary trough and roller damping arrangement.

Information on the care and operation of backwashers is given in an article on another page of this issue.

Method of Spot-Proofing Silk Goods

Can you give us information as to methods of spot-proofing silk goods? (3054)

Spot-proofing of silk means that the silk must be free from any dressing or finish of any kind that will dissolve in water. Consequently, it implies that the dyes used, if any, must be water fast, and that no gelatine or other size be present.

Water for Dyeing and Bleaching and Disposal of Effluents

A reply to the following questions, if consistent with your policy, will be highly appreciated.

1. Where and by whom can we have water analyzed to determine if suitable for dyeing and bleaching? Will one analysis serve for both?
2. After dyeing or bleaching, or both, if the water is conducted through city sewer pipes does it in any way damage the mains of the sewer system?
3. If the left over water should be emptied into a small stream of running water, this stream afterwards running through farms and timber sections, would it damage the growth along the stream? Would it be dangerous for stock or human beings to drink from this stream after the water has run, say, two or three hundred yards?
4. Is there any objectionable odor to the water in a small stream where the left over water from a dye and bleach plant is emptied? (3014)

Your questions depend largely upon local conditions, upon the amount of bleaching and dyeing that you propose to do,

upon the rate of flow and size of the stream that you propose to discharge into, etc., so it is difficult to give a satisfactory general answer. A mineral analysis of the water would show whether it is suitable for dyeing and bleaching. Whether the effluent would damage the mains of the sewer system would depend upon the material of which the mains are constructed.

We would suggest that you take up the problem with consulting chemists whose announcements will be found in the advertising pages. This would be most satisfactory in the end and might easily prove cheapest. It might not be necessary for them to send a man down, but this is something you can decide later.

Twine for Jacquard Harness and Harness Treatment

Do you know of a firm making a cotton twine as a substitute for the linen twine commonly used for making jacquard harness? If so, I would like to know their address. What is the average life of jacquard harness made of linen twine and how is the best way to treat new harness; what preparation do you advise? (3079)

As very likely the inquirer already knows, cotton neck cords are used extensively on jacquards, and while the majority of mills prefer linen jacquard heddles, which are known as mail eye heddles, very satisfactory results can be obtained by the use of baked or varnished cotton mail eye heddles. These are furnished by jacquard builders and dealers in supplies.

As yet no good cotton substitute has been developed which will take the place of the linen twine used in the jacquard harness proper. This is the twine which is fastened at one end to the top of the mail eye heddles and is then drawn through the wooden compart board and fastened to the lower end of the cotton or linen neck cord, which is attached to the bottom of the jacquard upright.

The Government has practically commandeered all linen stocks in this country and manufacturers have, therefore, for several months, been experimenting with various cotton twines, and they are quite confident that a cotton twine will be produced which will serve as an excellent substitute for linen twines in jacquard harnesses.

The average life of jacquard harnesses made from linen twine should be from seven to ten years, provided the jacquard is placed at the proper height above the loom so

that no acute angle exists, which would tend to rapidly wear the lines.

During ten years' life lines, neck cords, etc., have been breaking and in a good many cases have been replaced in an indifferent manner. A great deal depends upon the system employed in line and neck cord tying. In some mills the weavers and fixers are obliged to tie the lines and cords, and if they are not tied correctly it is only a matter of a short time before the tie is all askew. The remedy then is a new tie-up, a rather costly operation. In other mills a man or a boy is educated to this job and he gets to be an expert, with the result that the life of the harness is longer, there are less seconds and better satisfaction all around.

PREPARATION FOR VARNISHING

Jacquard builders have standard preparations for varnishing lines which are good. The experience of one manufacturer has been confined to a pure linseed oil, boiled. This is good because it keeps the lines soft and pliable, presenting a soft surface to the hole in the comber board, and quite often the lingoes, comber board and lines are all tied up in a bundle above the loom in order to permit the weaving of plain or other cloths. They remain in this condition or position for different periods, sometimes as long as a year. If some preparation to keep the lines pliable is not used, their condition when taken down again can be imagined. If shellac has been used, they are alternately hardening and softening from the different atmospheric conditions. The vibration of the machine has a bad effect on them, for it is understood that a jacquard will last longer when every line is being operated than when it is hung up.

A circular sent out by the Crompton & Knowles Loom Works regarding a treatment for new linen harnesses with their private preparations gives the following information:

The preparation should first be stirred thoroughly with a stick. The same result cannot be accomplished by shaking the can. Apply with a piece of clean cotton cloth. First saturate the cloth with the oil and then rub the harness well, avoiding as much as possible an up-and-down movement on the twine. After thus rubbing the harness thoroughly it should be wiped off with more clean cloth, otherwise the oil will harden on the harness in sufficient quantities to make same gummy and sticky, a feature to be avoided. The harness should then be allowed to dry for at least two days; the time depends somewhat on the atmospheric conditions.

Twine heddles should be treated in the same manner as the harness. Wetting them 4 or 5 inches either side of the mail eye is recommended. Use warm water with about a tablespoonful of soda to a pailful of water. The soda prevents the mail eyes from rusting. Be sure that the heddles are dry before the harness oil is applied. This is very important.

After the heddles have been treated with the harness oil, and have dried, they should be again treated about 4 or 5 inches either side of the eye with one coat of so-called heddle varnish and then again allowed to dry, after which the harness is ready for the warp.

There are two distinct and separate preparations mentioned in the above descriptive matter, viz., harness oil and heddle varnish, which should not be confused. They do not recommend the use of these preparations on harness leashes or heddles that have been treated in any way with any other preparations; in other words, they are for use only on twine in the gray; nor are they recommended for cotton harnesses.

A superintendent replies to this inquiry regarding method of treating harness, as follows: The life of jacquard harness is variable, depending upon the conditions under which the harness is used. I have seen jacquards in which the harness twine would begin to break in one year and others in which the twine would not begin to break for a much longer time.

If the jacquard harness is built up in a separate room for that purpose, there will not be any risk in using boiled oil, as it takes some time to dry, but if used in a dusty place the results are not as satisfactory. Boiled oil makes the harness smooth and keeps the twines soft and pliable. A small quantity of beeswax added to the oil will make it firmer. After varnishing, the harness twine should not be disturbed until dry, after which the twine can easily be separated. When starting up a new jacquard harness, French chalk is often used, which greatly assists in smoothing it.

Strength of China and Japan Silks

What was the relative breaking strengths of Japan and China gum silks about January 1, 1915, 1916 and 1917?
(3075)

There is no established relationship between the breaking

strengths of Japan and China silks, nor any tables or other data regularly published covering this point, as both classes of silks under all ordinary conditions are fully strong enough for all ordinary manufacturing purposes. The question of their relative strength would seem to be without much practical interest, particularly as there is a great variety of breeds, gradings and sizes in all of these silks. The silks produced in the different provinces will vary in nature and in strength from each other; the qualities will vary from season to season; the annuals, the bivoltines and the polyvoltines will present differences; and then each lot of silk may vary very materially from another lot produced under apparently precisely similar conditions. To arrive at any figures which would supply an answer to the question would be a commercial impracticability.

Derubberizing Cotton Goods

Kindly tell me how to derubberize a piece of waterproof cotton goods in order to ascertain the construction of the goods. (3058)

The best solvent for rubber is solvent naphtha, obtained from coal tar, and should not contain any benzol. If this product cannot be readily obtained, try digesting the rubberized fabric in turpentine. This latter substance, though not used industrially as a rubber solvent, has very distinct solvent properties. To use it, the cloth should be placed in a dry glass flask, well covered with turpentine, and the flask then placed in hot water (not over a flame!) and allowed to remain heated for some time. If the rubber is not completely dissolved, pour off the old turpentine and replace with fresh. Another solvent for rubber is aniline oil. This is used exactly as described for turpentine.

Printing on Cotton Goods

We make striped goods (warp face) of Egyptian mercerized and peeler cotton and get a two-tone effect in dyeing. Is it possible to get a two-tone jacquard effect by printing, with caustic soda, a figure on plain cotton goods and then dyeing? The contrast in color should be as much, or more if possible, as the contrast between Egyptian mercerized and peeler cotton dyed in the same bath. Please give formula.

Will peeler cotton treated with caustic soda dye as heavy a shade as mercerized peeler, both being treated with the same strength caustic?

Some Egyptian warps contain a peeler thread and when dyed will show up lighter. Is there any way to spot them out with cold dye?

What is the permanganate discharge process in making old style carriage robes? (Referred to in Question No. 3125). Do you know of any technical book that contains this process? (3132)

An expert dyer to whom we submitted this question replies as follows: It is quite possible to obtain a two-tone effect by first printing the cotton goods with caustic soda, and then dyeing with direct colors. The details of the entire operation are as follows: A caustic soda print paste is made according to this recipe:

Yellow dextrine.....150-200 parts
Water .....200-250 parts

Mix together, and heat until the dextrine has gone completely into solution, then add:

Cuastic soda lye 75° Tw.....600 parts

Stir well, and when cold it is ready for use.

The goods are printed on a cylinder machine or with hand blocks, according to the kind of design, and then dried at a moderate temperature. If the goods are to be dyed with direct dyeing colors, it is best to wash them before dyeing, so that the dyebath may not be contaminated with the excess of soda.

The dyeing is best done on a jig, and as soon as the washing is finished, since it is detrimental to allow the pieces to lie around the dyehouse for any length of time before dyeing. Too long an interval between the washing and dyeing seems to cause a loss of contrast in the desired effects. The best results are also obtained with a concentrated bath, but allowing a sufficient volume of liquor to permit the goods to be worked freely. The dyeing should commence cold, and allow to run for 15 to 20 minutes and then a further 15 or 20 minutes warm.

Many of the sulphur colors possess the same property of yielding two-tone effects on cotton goods treated as above. In this case, the temperature for dyeing is about 100° F., and the goods need not be washed after having been dried, as indicated for caustic printing to be followed with direct

color dyeing, since caustic is not detrimental in the sulphur color dyebath.

I think that peeler cotton, when treated with caustic soda, as above mentioned, will show the same contrast when dyed, but it is doubtful if the same depth of shade is to be expected on the light and dark parts of the pattern, as for goods made of other cotton.

Regarding the Egyptian warps containing peeler thread, I do not believe that it is possible to spot out the peeler thread by any cold dyeing process. It will be found that the two different cottons will take up dye in about the same proportion.

The permanganate process, used long ago, is based upon the chemical fact that when goods are immersed in a solution of permanganate of potash (or the soda salt) a brown deposit of oxide of manganese is formed that attached itself upon the fibers, and, according to the strength of the solution used, the shade is light or heavy. This oxide of manganese is dissolved in a solution of bisulphite of soda, leaving the brown spot perfectly white. For carriage robes, the brown portions were tied securely and then dipped in the bisulphite solution, thereby forming irregular patches strongly contrasting with the brown ground.

Plating on Large and Small Machines

Why is it that a small size machine does not plate as well as a large size machine? (3131)

It has been the experience of the writer that the small size machines plate better than the larger ones, other things being equal. I have always attributed this result to the fact that the yarn between the tubes in the latch ring and the edge of the needle cylinder was in contact with a longer arc of the needles, and the pressure of the yarn against the needles being greater seems to have a strong tendency to prevent the two ends from getting crossed in the knitting. However, if the needles were not well polished it is likely that the greater pressure of the yarn at this place might cause more trouble on the small machines.

My experience with quite a number of makes of machines, both circular and flat, has taught me to keep the yarns well apart at the feeding to the needles; and also to make the feed as short as possible. If possible, use a little

emulsion on the face yarn, particularly if it be worsted. It is always best to have a little tension on the backing yarn; this yarn, being on the inside of the fabric, should have a shorter stitch. Plating needles should be well polished, and I would recommend special needles with plating hooks for those cylinders which do not work properly. The tops of these needles are made as shown in the illustration.

Trouble in Knitting Full Fashion Hosiery

We are having trouble with the lather used in knitting hosiery on our full fashioned machines and come to you for help in solving the difficulty. We formerly used olive oil foots soap made from the imported foots, which is now impossible to get by reason of embargoes, so have substituted a soap called a red oil soap with a percentage of prime lard oil. But we find the needles on the knitters are rough and will not permit the fabric to work as smoothly as it should. Would there be anything in the soap that might cause this trouble? Would it be possible that a boiler compound would contain sufficient magnesia to injure the fabric as we use the steam from the boiler to heat the mixture in preparing the emulsion, and I understand the engineer has only lately been using the compound for the purpose of preventing scale? You would be conferring a great favor if you would bring this matter to the attention of your many readers, some of whom may be able to make suggestions or give formulas which would overcome the difficulty. (3112)

Olive oil foots soap differs in two essential ways from a soap made from red oil and neatsfoot oil. First, olive oil soaps are usually cold process soaps, and, consequently, retain all the glycerine that was originally present in the oil. A red oil soap made from either the redistilled or saponified oelic acid contains no glycerine whatever. The use of a qauntity of neatsfoot oil would supply some of the glycerine, depending on the proportion used. The second difference would consist in the amount of stearic acid present. Olive oil contains a very small amount of stearin, while both the commercial oelic acid (red oil) and neatsfoot oil contain fairly large amounts. It is a known fact that glycerine assists materially in the maintenance of a lather, soap bubbles containing it having been kept unbroken for several hours. In this connection we might suggest cocoanut oil soap, which is the greatest lather producer known, followed by palm oil, both, being principally palmitates, are unaffected by even salt

water. The two last named oils would also effect an economy in soap, as they require much smaller quantities to give equal viscosities, besides being unaffected by the common mineral salts likely to be encountered in water.

Boiler compounds are of two general classes—those which cause the separation of the mineral salts of the water in a colloidal form, allowing them to be blown off readily without a tendency to form scale, and the second class which cause an immediate precipitation. The first class of boiler compounds include caustic alkalies and tannins, also crude oil. The second class includes sodium fluoride.

It is quite possible that particles of the water from the boiler would find their way through the pipes and get into the soap, but we believe that a simple examination would soon show whether a curdy condition has developed. If such was the case a straining through a piece of cheese cloth would correct the trouble.

There is still a third possibility. It may be that the new soap contains free oelic acid, which will attack not only iron and steel, but brass and copper as well. This would lead to a pitting of the needles and occasional brown stains on the goods. The remedy would be to add a little caustic soda to the soap, and in conclusion this would be the best addition in any case, if the present soap is to be continued. The best change we can see, however, is to try cocoanut oil soap.

Animalizing Cotton Fiber

Noting a recent inquiry in your Questions and Answers Department for information regarding the woolenizing of jute yarn, it occurred to me to inquire whether you can furnish me with some information regarding the animalizing of cotton. I understand there is a method of dissolving the silk and treating the cotton with a solution causing the silk to be deposited on the cotton fiber. (3017)

The process of treating cotton yarns with solutions of silk or other animal substance so that the threads may possess the general properties of wool and take up colors similar to wool—in other words, "animalizing"—is not a commercial or technical possibility, at least in so far as being able to produce yarns that meet the fullest demands of fabric makers.

Partially successful attempts have frequently been made by treating cotton, first with tannic acid and afterwards with

gelatine solution. Other trials that gave promise were based upon a preliminary treatment of the cotton with gelatine and "fixing" it with alum, and later with formic acid. Further trials have been made by means of alkaline solutions of waste silk, drying the treated fiber and isolating the "fibroin" of the silk by passing the treated and dried fiber through a weak acid bath or through a solution of an acid salt solution.

None of these productions are of any importance except to serve as a starting point for further and more elaborate trials. Cotton yarns are known to be treated with solutions of artificial silk, but the object is to impart luster, and not for the purpose of animalizing. If a thorough animalizing of the cotton could be accomplished, it would be of untold benefit to the makers of woolen and union fabrics, and should return to its inventor or discoverer a magnificent revenue.

Metalizing Yarn

I have recently seen a reference to metalized yarn. Do you suppose mercerized yarn was meant, or is there a process of metalizing yarn? (3023)

There is a process of metalizing yarn and the following description of it was given some time ago in *L'Industrie Textile:*

The process of metalizing yarn consists in coating the yarn with a solution containing a metallic powder and an adhesive liquid. Casein has been used, but the adhesion is not durable, Others have preferred gelatine, which adheres to the yarn more firmly, but is open to the objection of being very hygroscopic, causing mould. Attempts have been made to protect the metalized yarn against the action of moisture by applying a transparent solution of celluloid or collodion, but this gives the yarn a lustrous appearance different from that of metal. Edmond Dhunnausen has found after repeated experiments that casein glue adheres firmly when the yarn has been previously treated with a mixture of gelatine and a powder insoluble in that material. The casein glue is loaded with the metallic powder to give the desired appearance. The yarn is passed through a bath consisting of

Gelatine	25 parts
Metallic powder	25 parts
Water	25 parts

After drying for about twenty minutes the yarn is passed through a bath made up as follows:

Casein	15 parts
Borax	5 parts
Water	80 parts
Metallic powder	30 parts

After drying a second time very rapidly the yarn is passed through a second bath or in a bath of the same composition. The weight of the metallic powder used varies according to the specific gravity and the nature of the material. The effect can be varied by adding different colors to the last bath.

Pin Holes in Bag Goods

We are having trouble with "pin holes" in our bag goods that are heavily starched. Can you make any suggestions that will overcome this difficulty? We do not gelatinize our starch, stopping the boiling shortly before this point is reached, as we think that to gelatinize it makes it too sticky. Instead of the regular starch mangle we use a "Tommy Dodd." (2924)

The inquirer is having the same trouble that others have experienced, but the data supplied is rather indefinite to base any definite suggestions on. There are many causes the difficulty might arise from. The mixings may be all wrong; the goods may be calendered too heavily before starching; the machine may not be set right, or the running of the cloth through the machine may not be sufficient to overcome the trouble. If we had full particulars as to the mixings used, the run of cloth in the preparation for the filling, length of time the goods are boiled in the mixings, a diagram of the machine, and any other details, we are quite sure we can be of assistance. We would also like to know the kind of tub used, as it is very difficult to give advice without seeing the machines or knowing the details. Until we get further information as outlined above it would be futile to offer any further suggestions. Be specific on the boiling point. We presume from the question that you stop the steam before the boiling point is reached.

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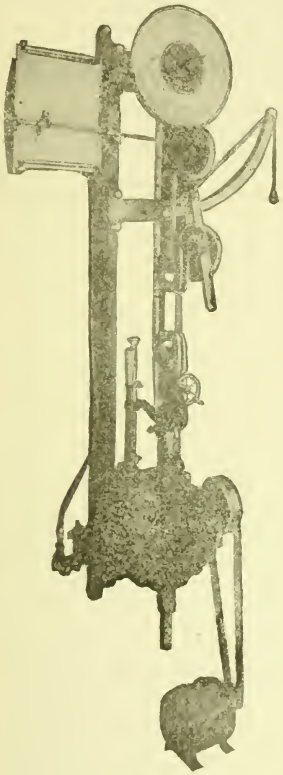

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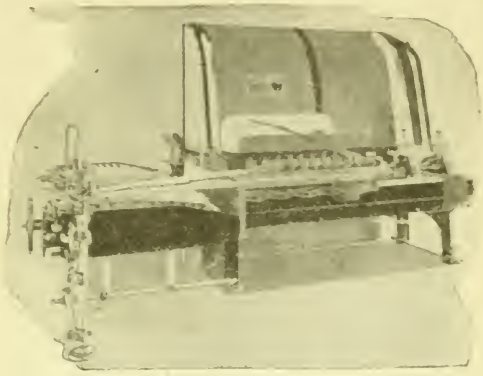

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